



# Department of the Navy

## Environmental Restoration Program Manual

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## Preface

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This revision of the Department of the Navy Environmental Restoration Program (DON ERP) Manual updates and replaces the 2006 Department of the Navy Environmental Restoration Program Manual. This Manual applies to Department of the Navy (DON) Environmental Restoration (ER) sites on active and Base Realignment and Closure (BRAC) installations located in the United States and territories of the United States.

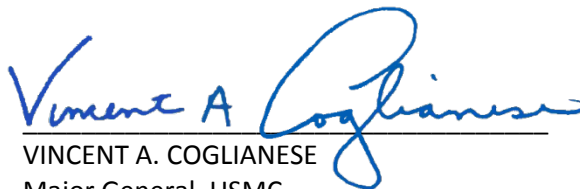
Some of the significant changes made to the cleanup program since 2006 include:

- Elimination of the October 1986 Active Base Installation Restoration Program (IRP) funding eligibility date;
- Elimination of the September 2002 Active Base Military Munitions Response Program (MMRP) funding eligibility date;
- Establishment of new Department of Defense (DoD) ER Program (ERP) goals based on the Response Complete (RC) milestone; and
- Establishment of the Marine Corps Installations Command (MCICOM).

The DON ERP Manual is a user-friendly policy and guidance tool for remedial project managers (RPMs) and other professionals working to support ER. It summarizes the organization and responsibilities of DoD and DON offices and provides detailed descriptions of terminology and procedures used to implement the ER program. The DON ERP Manual explains funding eligibility, priority setting, reporting, and information management systems. The information in this Manual is a comprehensive reference for the user to properly identify, investigate, select, and implement protective and cost-effective remedies for the remaining DON ERP sites.



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## Acronyms

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AA	area of attainment
AAR	After Action Report
ACL	alternate concentration limit
ACO	Administrative Contracting Officer
AGC(Litigation)/NLO	Associate General Counsel (Litigation)/Navy Litigation Office
AHA	Activity Hazard Analysis
AIRFA	American Indian Religious Freedom Act
AM	Action Memorandum
AMA	American Management Association
AOC	area of concern
APP	Accident Prevention Plan
AR	Administrative Record
ARAR	applicable or relevant and appropriate requirement
ARPA	Archeological Resources Protection Act
ARTT	Alternative Restoration Technology Team
ASD(EI&E)	Assistant Secretary of Defense (Energy, Installations, and Environment)
ASN(EI&E)	Assistant Secretary of the Navy (Energy, Installations, and Environment)
AST	aboveground storage tanks
ASTM	American Society for Testing and Materials
ATSDR	Agency for Toxic Substances and Disease Registry
BCM	Base Closure Manager
BCP	BRAC Cleanup Plan
BCT	BRAC Cleanup Team
BD/DR	building demolition/debris removal
BEC	BRAC Environmental Coordinator
BERA	baseline ecological risk assessment
BHHRA	baseline human health risk assessment
BIP	blow in place
BMS	Business Management System
BRAC	Base Realignment and Closure (Act)
BRRM	Base Redevelopment and Realignment Manual
BUMED	Bureau of Medicine and Surgery
CA	Corrective Action
CAA	Clean Air Act
CAMU	corrective action management unit
CASU	Cooperative Administrative Support Unit
CECOS	Civil Engineer Corps Officer School
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
CFR	Code of Federal Regulations
CHE	Chemical Warfare Material Hazard Evaluation
CHF	contaminant hazard factor
CIP	Community Involvement Plan (formerly Community Relations Plan)
CLEAN	Comprehensive Long-Term Environmental Action, Navy

CLC	Continuous Learning Center
CLP	Contract Laboratory Program
CMC	Commandant of the Marine Corps
CMC(LF)	Commandant of the Marine Corps (Facilities and Services Division)
CNIC	Commander, Navy Installations Command
CNO	Chief of Naval Operations
CNO N4	Deputy Chief of Naval Operations (Logistics)
CNO N45	Chief of Naval Operations, Energy and Environmental Readiness Division
CO	Commanding Officer
COC	chemical of concern
COPC	chemical of potential concern
COR	Contracting Officer's Representative
CPARS	Contractor Performance Assessment Reporting System
CPR	cardiopulmonary resuscitation
CRP	Community Relations Plan (now known as Community Involvement Plan)
CSM	conceptual site model
CTC	cost-to-complete
CTE	central tendency exposure
CWA	Clean Water Act
CWM	chemical warfare material

DASN(E)	Deputy Assistant Secretary of the Navy (Environment)
DAU	Defense Acquisition University
DAWIA	Defense Acquisition Workforce Improvement Act
DD	Decision Document
DDESB	Department of Defense Explosives Safety Board
DENIX	Defense Environmental Network Information Exchange
DERP	Defense Environmental Restoration Program
DFW	definable feature of work
DGC(E&I)	Deputy General Counsel for Environment and Installations
DGM	digital geophysical mapping
DGPS	Differential Global Positioning System
DLA	Defense Logistics Agency
DMM	discarded military munitions
DNAPL	dense, nonaqueous-phase liquid
DoD	Department of Defense
DoDD	Department of Defense Directive
DoDI	Department of Defense Instruction
DoDM	Department of Defense Manual
DOE	Department of Energy
DOJ	Department of Justice
DON	Department of the Navy
DON ERP	Department of the Navy Environmental Restoration Program
DQO	data quality objective
DSMOA	Defense and State Memorandum of Agreement

EC	emerging contaminant
ECOS	Environmental Council of States



ECP	Environmental Condition of Property
EE/CA	Engineering Evaluation/Cost Analysis
EHE	explosive hazard evaluation
ELAP	Environmental Laboratory Accreditation Program
EM	Engineering Manual
EMI	electromagnetic induction
EO	Executive Order
EOD	Explosive Ordnance Disposal
EODTECHDIV	Explosive Ordnance Disposal Technology Division
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EPM	Environmental Protection Manager
ER	Environmental Restoration
ERA	ecological risk assessment
ERB	Environmental Restoration and BRAC website
ER,N	Environmental Restoration, Navy
ERP	Environmental Restoration Program
ESA	Endangered Species Act
ESD	Explanation of Significant Difference(s)
ESS	Explosives Safety Submission
ESS DR	Explosives Safety Submission Determination Request
ESTCP	Environmental Security Technology Certification Program
ETA	Early Transfer Authority (DoD)
EXWC	Engineering and Expeditionary Warfare Center
FAC	NAVFAC Atlantic and Pacific
FAQ	Frequently Asked Question
FEAD	Facility Engineering and Acquisition Division
FEC	Facilities Engineering Command
FFA	Federal Facility Agreement
FFCA	Federal Facilities Compliance Act
FFSRA	Federal Facility State Remediation Agreement
FOIA	Freedom of Information Act
FOSET	finding of suitability for early transfer
FOSL	finding of suitability to lease
FOST	finding of suitability to transfer
FR	Federal Register
FRTR	Federal Remediation Technologies Roundtable
FS	Feasibility Study
FSP	Field Sampling Plan
FUDS	formerly used defense site(s)
FY	Fiscal Year
FYDP	Future Year Defense Plan
GIS	Geographic Information System(s)
GHG	greenhouse gas
GOCO	government-owned/contractor-operated
G-RAM	general radioactive material

GSR	green and sustainable remediation
GSV	geophysical system verification
HA	hazard assessment
HAP	hazardous air pollutant
HARP	Historic and Archeological Resources Program
HASP	Health and Safety Plan
HAZWOPER	hazardous waste operations and emergency response
HHE	Health Hazard Evaluation
HHRA	human health risk assessment
HQ	headquarters
HRA	Historical Radiological Assessment
HRS	Hazard Ranking System (EPA)
HRSC	high resolution site characterization
IA	Integrated Assessment
IAS	Initial Assessment Study
IDIQ	indefinite delivery and indefinite quantity
IDLH	immediately dangerous to life and health
IDP	individual development plan
IDW	investigation-derived waste
I-RACR	Interim Remedial Action Completion Report
IRIS	Integrated Risk Information System
IRP	Installation Restoration Program
ITRC	Interstate Technology and Regulatory Council
IVS	Instrument Verification Strip
JAG	Judge Advocate General
JEP	Joint Execution Plan
KBCRS	Knowledge Based Corporate Reporting System
KO	Contracting Officer
LDR	land disposal restriction
LLRW	low-level radioactive waste
LNAPL	light, nonaqueous-phase liquid
LTM	long-term monitoring
LTMgt	Long-Term Management
LUC	land use control
MARCORSYSCOM	Marine Corps Systems Command
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MC	munitions constituents
MCICOM	Marine Corps Installations Command
MCL	maximum contaminant level
MCO	Marine Corps Order
MEC	munitions and explosives of concern
MILCON	military construction

MMA	Management and Monitoring Approach
MML	Master Materials License (Navy's)
MMPA	Marine Mammal Protection Act
MMRP	Military Munitions Response Program
MNA	monitored natural attenuation
MNR	monitored natural recovery
MOU	memorandum of understanding
MPF	migration pathway factor
MPPEH	material potentially presenting an explosive hazard
MR	munitions response
MRP	Munitions Response Program (DON)
MRS	munitions response site
MRSP	Munitions Response Site Prioritization Protocol
MTR	minimum technology requirement
NAGPRA	Native American Graves Protection and Repatriation Act
NARM	naturally-occurring and accelerator-produced radioactive materials
NAVAIR	Naval Air Systems Command
NAVFAC	Naval Facilities Engineering Command
NAVSEA	Naval Sea Systems Command
NAVSEADET RASO	Naval Sea Systems Command Detachment Radiological Affairs Support Office
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NCR	Navy Cost Reimbursement
NDA	Non-Disclosure Agreement
NDAA	National Defense Authorization Act
NEDD	NIRIS Electronic Data Deliverable
NEPA	National Environmental Policy Act
NESDI	Navy Environmental Sustainability Development to Integration
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NETI	National Enforcement Training Institute (EPA)
NFA	no further action
NHPA	National Historic Preservation Act
NIOSH	National Institute for Occupational Safety and Health
NIRIS	Naval Installation Restoration Information Solution
NNPP	Naval Nuclear Propulsion Program
NMCPHC	Navy and Marine Corps Public Health Center
NOID	Notice of Intent to Delete
NORM	"Normalization" of Environmental Data Systems
NOSSA	Naval Ordnance Safety and Security Activity
NOSSAINST	NOSSA Instruction
NPL	National Priorities List
NPV	net present value
NRC	Nuclear Regulatory Commission
NRD	natural resource damage
NRDA	natural resource damage assessment
NRI	natural resource injury
NRSC	Naval Radiation Safety Committee

NSWC IHEODTD	Naval Surface Warfare Center Indian Head Explosive Ordnance Disposal Technology Division
NTCRA	non-time critical removal action
OASN(FM&C)	Office of the Assistant Secretary of the Navy, Financial Management and Comptroller
O&M	operations and maintenance
OEA	Office of Economic Adjustment
OER2	Open Environmental Restoration Resource
OGC	Office of the General Counsel
OMB	Office of Management and Budget
ONR	Office of Naval Research
OP 5	Ordnance Pamphlet 5
OPNAV	Office of the Chief of Naval Operations
OPNAVINST	Office of the Chief of Naval Operations Instruction
OPS	Operating Properly and Successfully
OSD	Office of the Secretary of Defense
OSH	Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response (EPA)
OU	operable unit
PA	Preliminary Assessment
PA/SI	Preliminary Assessment/Site Inspection
PAH	polycyclic aromatic hydrocarbon
PAO	Public Affairs Officer
PCB	polychlorinated biphenyl
PCO	Procuring Contracting Officer
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFC	perfluorinated compound
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PHA	Public Health Assessment
PMO	Program Management Office (BRAC)
POL	petroleum, oil, or lubricants
POM	Program Objective Memorandum
P-OPT	Portfolio-Optimization
PP	Proposed Plan
PPBE	Planning, Programming, Budgeting and Execution
PPE	personal protective equipment
ppm	part per million
PRG	preliminary remediation goal
PRP	potentially responsible party
PQO	project quality objective
QA	quality assurance
QA/QC	quality assurance/quality control

QAPP	Quality Assurance Project Plan
QASP	Quality Assessment Surveillance Plan
QC	quality control
QSM	Quality Systems Manual
R&D	research and development
RA	Remedial Action
RAA	Remedial Alternatives Analysis
RAB	Restoration Advisory Board
RA-C	Remedial Action Construction
RAC	remedial action contract
RACER	Remedial Action Cost Engineering and Requirements
RACR	Remedial Action Completion Report
RADIAC	Radiation, Detection, Indication and Computation
RAGS	Risk Assessment Guidance for Superfund (EPA)
RA-O	Remedial Action Operation
RAO	Remedial Action Objective
RASP	Radiological Affairs Support Program
RAW	Risk Assessment Workgroup
RAWP	Remedial Action Work Plan
RC	Response Complete
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RDM	Regional Data Manager
RD/RA	Remedial Design/Remedial Action
RDT&E	Research, Development, Testing, and Evaluation
REC	Regional Environmental Coordinator
RERA	Risk Evaluation of Remedial Alternatives
RF	receptor factor
RFA	RCRA Facility Assessment
RFI	Request for Information
RFP	Request for Proposal
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RIMP	Regional Integrated Master Program
RIP	Remedy in Place
RITS	Remediation Innovative Technology Seminar
RME	Reasonable Maximum Exposure
ROD	Record of Decision
ROICC	Resident Officer in Charge of Construction
RPM	Remedial Project Manager
RRSEM	Relative Risk Site Evaluation Model
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SC	Site Closeout
SCBA	self-contained breathing apparatus

SDWA	Safe Drinking Water Act
SECDEF	Secretary of Defense
SECNAV	Secretary of the Navy
SECNAVINST	Secretary of the Navy Instruction
SEED	SERDP Exploratory Development
SERDP	Strategic Environmental Research and Development Program
SF	Site File
SHSO	Site Health and Safety Officer
SI	Site Inspection
SMART	specific, measureable, attainable, relevant, and time bound
SME	subject matter expert
SMP	Site Management Plan
SOP	Standard Operating Procedure
SOW	Statement of Work
SPAWAR	Space and Naval Warfare Systems Command
SRA	screening risk assessment
SSP	Strategic Systems Command, Strategic Systems Programs
SVOC	semi-volatile organic compound
SWMU	solid waste management unit
T2	technology transfer
TAG	Technical Assistance Grant
TAPP	Technical Assistance for Public Participation
TCE	trichloroethene
TCRA	time critical removal action
TDS	TechData Sheet
TDWG	Technology Development Workgroup
TENORM	technologically enhanced naturally occurring radioactive materials
TIPS	Technical Insights and Problem Solving
TIW	technical impracticability waiver
TO	Task Order
TO COR	Task Order Contracting Officer's Representative
TOI	target of interest
TPOC	technical point of contact
TRC	Technical Review Committee
TSCA	Toxic Substances Control Act
TSD	treatment, storage, and disposal
UDCM	user defined cost model
UFP-QAPP	Uniform Federal Policy for Quality Assurance Project Plans
UG	Users Guide
UIC	User Identification Code
USACE	United States Army Corps of Engineers
USC	United States Code
USCG	United States Coast Guard
USGS	United States Geological Survey
UST	underground storage tank
UU/UE	unlimited use and unrestricted exposure



UXO	unexploded ordnance
VI	vapor intrusion
VOC	volatile organic compound
WAWF	Wide Area Workflow
WCSD	Watershed Contaminated Source Document

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## Chapter 1

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### Legal and Historical Context of the Environmental Restoration Program

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**Note:** The Department of the Navy (DON) Environmental Restoration Program (ERP) is governed and executed via various policies, instructions, and guidance documents which are referenced throughout this Manual. Most of these references, including important web links, can be accessed on the Naval Facilities Engineering Command (NAVFAC) Environmental Restoration (ER) and Base Realignment and Closure (BRAC) website (hereafter referred to as “ERB”) [www.navfac.navy.mil/go/erb](http://www.navfac.navy.mil/go/erb) and/or on the Defense Environmental Network Information Exchange (DENIX) website [www.denix.osd.mil](http://www.denix.osd.mil).

The Department of the Navy Environmental Restoration Program (DON ERP) Manual is intended to be consistent with existing Department of Defense (DoD), federal, and state guidelines, executive orders (EOs), regulations, and laws. In the event of a conflict between this DON ERP Manual and statutory or regulatory requirements, this Manual shall not supersede such statutory or regulatory requirements.

#### 1.1 Introduction

Throughout this DON ERP Manual, the term “DON ERP” represents the one Department of the Navy Environmental Restoration Program, to include active bases, closed bases, and all ER activities funded by either the Environmental Restoration, Navy (ER,N) account, or the BRAC account, for all of the Navy and the Marine Corps.

This Manual can be used to assist in program management, staff training, and as a reference for DON ERP implementation and execution. This Manual represents a compilation of Defense Environmental Restoration Program (DERP) requirements, policy, and guidance, and focuses on procedural requirements for managing DON ERP sites from the time of identification to final closeout. This Manual is consistent with the requirements established by these DoD and DON environmental management manuals:

- [Defense Environmental Restoration Program \(DERP\) Management Manual](#) (DoD Manual [DoDM] 4715.20) (hereafter referred to as “[DERP Manual](#)”);
- [DON Environmental Readiness Program Manual](#) (Office of the Chief of Naval Operations [OPNAV] M-5090.1) (hereafter referred to as “[OPNAV M-5090.1](#)”); and
- [Marine Corps Environmental Compliance and Protection Manual](#) (Marine Corps Order [MCO] P5090.2A) (hereafter referred to as “[MCO P5090.2A](#)”).

The DERP is applicable only within the United States and its territories and possessions. Restoration activities abroad are carried out in accordance with international agreements (see [Remediation of Environmental Contamination Outside the United States](#)) (DoD Instruction [DoDI] 4715.08).

##### 1.1.1 Department of the Navy Environmental Restoration Program

A clean and healthy environment is essential for supporting DON’s primary mission of ‘Warfighting First, Operate Forward, and Be Ready’. Although past activities have resulted in the release of contaminants into the environment, DON ERP continues to make significant progress toward cleaning up and closing sites in an efficient, effective, and sustainable manner.

DON established the Naval Assessment and Control of Installation Pollutants Program in the 1980s, mandating an Initial Assessment Study (IAS) of all DON installations. This program was renamed the Installation Restoration Program (IRP) after the passage of the Superfund Amendments and

Reauthorization Act of 1986 (SARA). As bases began closing under BRAC, the program was again renamed. The current ERP more clearly reflects ER requirements identified in the DERP. The DON ERP combines aggressive policies, technical training, innovative technologies, stakeholder partnerships, and proactive, dedicated personnel to clean up past contamination on property under Navy and Marine Corps stewardship. The program goals are:

- The identification, investigation, and cleanup of contamination from a hazardous substance or pollutant or contaminant;
- Correction of other environmental hazards (such as detection and disposal of unexploded ordnance [UXO]) which creates an imminent and substantial endangerment to public health/welfare or to the environment; and
- Demolition and removal of unsafe buildings and structures, including buildings and structures of the DoD at sites formerly used by or under the jurisdiction of the Secretary of Defense (SECDEF).

Most DON installations provide a variety of support functions for aircraft, submarines, and ships. Historic waste management practices associated with these activities have resulted in the release of contaminants to soil, sediment, and groundwater at many DON sites. Examples include:

- Petroleum hydrocarbons released to soil and groundwater at leaking underground storage tank (UST) sites, tank farms, or former fire-fighting training areas;
- Historic equipment cleaning and degreasing operations which led to chlorinated solvent releases to the environment;
- Munitions and explosives of concern (MEC) on sites that were formerly used for military training operations or discarded military munitions (DMM) previously stored at installations;
- Sediments contaminated with chemicals such as polycyclic aromatic hydrocarbons (PAHs) or polychlorinated biphenyls (PCBs) through a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) release;
- Former luminescent dial maintenance areas and landfills where general radioactive material (GRAM) products were disposed (aircraft maintenance, shipyards);
- Other contaminant releases resulting from miscellaneous activities at DON installations, including municipal solid waste landfills, paint shops, plating shops, dry cleaners, firing ranges, and fire-fighting training areas; and
- Vapor intrusion (VI) at sites where buildings are present above or near contaminated soil or groundwater and volatile chemicals have migrated from the subsurface to indoor air.

The cleanup of DON installations poses challenges due to the wide variety of activities conducted at these sites and the environmental settings (e.g. coastal regions, deep groundwater, and ecologically sensitive habitats). Over 5,500 sites are currently in the DON ERP.

The DON ERP is organized into the following program categories:

- **Installation Restoration Program (IRP):** The DON IRP was designed to identify and clean up past contamination from chemical and radiological contaminants, hazardous substances, and pollutants to protect human health and safety, and the environment at both Navy and Marine Corps installations. Approximately 5,120 IRP sites are currently at DON active and BRAC installations.

- **Munitions Response Program (MRP):** As part of the Fiscal Year (FY) 2002 Defense Authorization Act, Congress mandated that DoD and the military components develop a program to address military munitions as part of the DERP. DoD responded by establishing the DoD Military Munitions Response Program (MMRP) under the DERP to address the explosives safety hazards associated with MEC, as well as the human health and environmental risks associated with munitions constituents (MC). MMRP will be referred to as the MRP in this Manual. The MRP addresses human and ecological health and safety hazards from UXO, DMM, and MC. A limited number of hazards associated with military munitions were addressed under the IRP incidental to the hazardous waste remediation program. Over 400 MRP sites are in the DON ERP.
- **Building Demolition/Debris Removal (BD/DR):** This category provides for the demolition and removal of unsafe buildings or structures that are subject to CERCLA hazardous substances or pollutants or contaminants. DON conducted these in the past but the current and projected DON plan has no funds budgeted for this category. DoD approval is required prior to proceeding in this category.

Collectively, these categories address the different contaminants likely to impact DON installations.

Although the IRP and MRP generally follow the same procedures, the MRP has some unique characteristics which are addressed in Chapter 12.

DON response actions reasonably interpret and apply Environmental Protection Agency (EPA) policy and guidance when making cleanup decisions.

## 1.2 Legislation

A comprehensive discussion of the body of environmental laws that could potentially affect the DON ERP is beyond the scope of this Manual. The following subsections provide a general framework for understanding legal and regulatory standards that are likely to influence the DON ERP.

### 1.2.1 Environmental Restoration Laws

#### **Comprehensive Environmental Response, Compensation, and Liability Act of 1980**

[CERCLA](#), passed in 1980, created the legal mechanism for cleaning up abandoned or uncontrolled hazardous waste sites. Although CERCLA did not apply to military installations, its provisions were adopted by the DoD as a model for environmental cleanups by the military components (Army, Air Force, Navy, and Marine Corps). Therefore, ER efforts at DON installations generally follow the process established by CERCLA.

CERCLA (also known as Superfund) was created in direct response to Love Canal and other notable hazardous substance release/contamination incidents. CERCLA directly addresses environmental releases or threatened releases to the air, surface water, groundwater, sediment, and soil; however, CERCLA does not include releases of petroleum, natural gas, and synthetic gas useable for fuel except to the extent that these substances have been used in a manner that introduces hazardous substances (e.g., deliberate mixture, or machinery use such that heavy metals are absorbed). Normally, releases in a structure (e.g., asbestos in a building) are excluded from CERCLA action.

CERCLA authorizes the President to study and remediate releases or potential releases of hazardous substances that present a substantial danger to public health/welfare or the environment. CERCLA also authorizes the President to delegate these responsibilities to EPA and other federal agencies, which subsequently were authorized through EO 12580 in 1987 with further important delegations in EO 13016 in 1996. Responsible parties may take action if willing and able to do so in a timely manner. If no responsible party is available, willing, and able to take appropriate action, EPA or another federal lead

agency may respond using in-house and contract resources funded by Superfund. If any federal lead agency takes action, that agency can recover the cost of its efforts from any or all potentially responsible parties (PRPs).

Congress did not specify cleanup standards in CERCLA (see CERCLA Title 42, Chapter 103, Subchapter I, §9621). Rather, Congress created a process whereby cleanup standards found in other federal and state laws and regulations are applied to a particular CERCLA action. This process is known as selection of applicable or relevant and appropriate requirements (ARARs). A law or regulation is “applicable” if the legal standard would apply independently of CERCLA. Generally, a law or regulation is “relevant and appropriate” if it makes sense to apply it at the site even though it is not otherwise legally required. (See Section 8.4.1 for a detailed discussion and description of ARARs.)

Under CERCLA §121(e), no federal, state, or local permit is required for on-site CERCLA response actions. EPA’s interpretation of CERCLA §121(e) waives the requirement to obtain a permit and the associated administrative and procedural requirements of permits, but not the substantive provisions of permitting regulations that are ARARs.

CERCLA §120(a)(2) prohibits DoD from adopting any guidelines, rules, regulations or criteria that are inconsistent with EPA’s guidelines, rules, regulations and criteria (see 42 United States Code [USC] §9620(a)(2)). It is DON policy that:

- All actions carried out under the DON ERP comply with all applicable requirements of CERCLA; and
- The terminology used by the DON ERP is consistent with that used in CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 42 USC § 9620(a)(2).

### **Superfund Amendments and Reauthorization Act of 1986**

CERCLA, as originally enacted in 1980, did not include specific provisions for ER at DoD sites. This changed in 1986 with the passage of [SARA](#), which provides that all federal facilities “shall be subject to, and comply with, this Act in the manner and to the same extent, both procedurally and substantively, as any non-government entity.” Additionally, SARA established the DERP.

### **Defense Environmental Restoration Program Act of 1986**

Through the DERP, DoD conducts ER activities at sites on active installations, installations undergoing BRAC, and Formerly Used Defense Sites (FUDS). The Office of the Secretary of Defense (OSD) provides oversight for the DERP; however, each military department is responsible for its implementation. The DERP has a substantially larger scope than CERCLA. Key differences include:

- DERP funds may be used to remediate certain petroleum releases;
- Sites do not need to be on the National Priorities List (NPL) to be managed using DERP funds;
- Remediation at federally-owned facilities may not be funded by the EPA-managed Superfund;
- DERP-funded projects include certain requirements for Interagency Agreements, Annual Reports to Congress, and Restoration Advisory Boards (RABs);
- DoD serves as the lead agency on DoD remediation projects. DoD has delegated its lead agency status to the individual military departments; and
- An emergency removal action, which addresses imminent and substantial endangerment to human health or the environment, is exempt from advance consultation with EPA and state and local agencies, if consultation is impractical.



## **Emergency Planning and Community Right-to-Know Act**

SARA includes several freestanding provisions of law, known as the [Emergency Planning and Community Right-to-Know Act](#) (EPCRA). EPCRA provides for public reporting of releases of certain toxic substances, as well as reporting of information related to hazardous substance storage to local emergency response agencies. As originally written, EPCRA was not applicable to federal facilities. However, in 1993, the President issued EO 12856, which placed federal agencies under the substantive requirements of EPCRA.

## **Community Environmental Response Facilitation Act**

The 1992 amendments to CERCLA, known as the [Community Environmental Response Facilitation Act](#) (CERFA), adopt provisions that facilitate the rapid identification and return to local communities of clean properties identified in the BRAC process. CERFA requires DON to identify uncontaminated properties at installations on which operations are closed or realigned in accordance with a base closure law no later than 18 months after the date on which the real property is selected for closure or realignment.

## **National Oil and Hazardous Substances Pollution Contingency Plan**

The [NCP](#) (40 Code of Federal Regulations [CFR] Part 300) is the regulation that implements CERCLA. The NCP provides the organizational structure and procedures to prepare for and respond to discharges of oil and the release or threatened release of hazardous substances or pollutants or contaminants. The NCP also outlines actions to be taken upon discovery of a release and following notification of a release of a hazardous substance in a reportable quantity. DON policy is to comply with the NCP for all sites under CERCLA authority.

## **Resource Conservation and Recovery Act**

The [Resource Conservation and Recovery Act](#) (RCRA) corrective action (CA) requirements and the state-led RCRA UST cleanup requirements can be applied to DON facilities by regulatory agencies. A discussion of the interface between RCRA and CERCLA is provided in Section 13.1.

RCRA provides the general regulatory framework for management of solid and hazardous wastes and waste management facilities. RCRA provides standards for:

- Cradle-to-grave tracking of hazardous wastes, including recordkeeping on the generation, transportation, storage, and disposal of hazardous wastes;
- Operation and closure of hazardous and solid waste management units (SWMUs);
- Recycling and federal affirmative procurement;
- UST construction and operation;
- CA of USTs; and
- CA to address releases of hazardous waste and hazardous constituents at RCRA-permitted and interim status facilities.

There are special EPA provisions for site remediation projects under RCRA. Some of these include:

**Area of Contamination Policy:** EPA interprets RCRA to allow certain discrete areas of generally-dispersed contamination to be considered as RCRA units. Because an area of contamination is equated to a RCRA land-based unit, consolidation and in situ treatment of hazardous waste within the area of contamination do not create a new point of hazardous waste generation for purposes of RCRA. This interpretation allows wastes to be consolidated or treated in situ within an area of contamination without triggering land disposal restrictions (LDRs) or minimum technology

requirements (MTRs) that apply to active hazardous waste treatment, storage, and disposal (TSD) facilities.

**Corrective Action Management Units (CAMUs) and Corrective Action Temporary Units:** The CAMU rule creates a new type of RCRA unit specifically intended for TSD of hazardous remediation waste. Under the CAMU rule, EPA and EPA-authorized states may develop and impose site-specific design, operating, closure, and post-closure requirements for CAMUs in place of MTRs for land-based units. Remediation waste placed in approved CAMUs does not have to meet LDR treatment standards. Under the temporary unit regulations, EPA and authorized states can modify existing MTR design, operating, and closure standards for temporary tank and container units used to treat and store hazardous remediation waste. Temporary units can operate for one year, with an opportunity for a one-year extension. Regulatory requirements for these units are provided in [40 CFR Part 264 Subpart S](#).

**Treatability Studies Exemption:** The term treatability study refers to a study of a hazardous waste subjected to a treatment process to determine: (1) whether the waste is amenable to the treatment process; (2) what pretreatment is required; (3) the optimal process conditions needed to achieve the desired results; (4) the efficiency of a treatment process for a specific waste or wastes; or (5) the characteristics and volumes of residuals from a particular treatment process. Under regulations of [40 CFR Part 261.4\(e\) and \(f\)](#), hazardous wastes managed during a treatability study are exempt from many RCRA Subtitle C requirements. The regulations limit the amount of waste that may be managed under an exempt treatability study to, generally, 1,000 kg of hazardous waste or 1 kg of acutely hazardous waste per study. For contaminated environmental media, the volume limit generally is 10,000 kg of media that contain non-acutely hazardous waste, and 2,500 kg of media containing acutely hazardous waste per study. [Management of Remediation Waste Under RCRA](#) [EPA/530/F-98/026] describes the limits on the types and lengths of studies that may be conducted under the exemption, as well as recordkeeping and reporting requirements.

### **Federal Facility Compliance Act**

The [Federal Facility Compliance Act](#) (FFCA) clarifies and expands the enforcement authority of federal and state regulators with respect to solid and hazardous waste management at federal facilities. The FFCA makes federal facilities fully responsible for RCRA violations resulting from their management of hazardous wastes. The FFCA also provides for annual inspections of federal facilities by EPA or any state with an authorized hazardous waste program.

The FFCA waives federal immunity from fines and penalties imposed as a result of failing to comply with federal, state, and local procedural and substantive requirements relating to RCRA. Although the FFCA relieves federal employees from personal liability or civil penalties resulting from acts or omissions within the scope of their official duties, criminal liability under any federal or state hazardous waste law is not waived.

### **Toxic Substances Control Act**

The [Toxic Substances Control Act](#) (TSCA) authorizes EPA to establish regulations pertaining to the testing of chemical substances and mixtures, pre-manufacturing notification for new chemical substances or significant new uses for existing chemical substances, control of chemical substances or mixtures that pose an imminent hazard, and recordkeeping and reporting requirements. Of these, the regulations controlling hazardous chemicals are potential ARARs for CERCLA actions. TSCA requires EPA to promulgate regulations when there is a reasonable basis to conclude that a chemical substance or mixture presents or will present an unreasonable risk of injury to human health or the environment. A

demonstration that a chemical will present an unreasonable risk is made based on a qualitative or quantitative risk assessment, which evaluates the likelihood that a chemical will cause adverse effects either to human health or the environment. The results of the risk assessment are used to determine whether EPA should regulate activities involving the use of the chemical or whether the chemical should be referred to another agency (e.g., the Occupational Safety and Health Administration [OSHA]) for regulation.

With respect to CERCLA cleanup actions, TSCA cleanup numbers should be considered during the analysis of ARARs. Of particular relevance to the DON ERP are the regulations and policies designed to reduce risks to human health and the environment from specific priority chemicals (i.e., National Program Chemicals) which include PCBs. Requirements and responsibilities for management of PCBs are specified in Chapter 25 of [OPNAV M-5090.1](#) and Chapter 19 of [MCO P5090.2A](#). Additional information on PCB cleanups is provided in Section 13.4 of this Manual.

### **1.2.2 Natural and Cultural Preservation Laws**

Although not directly pertaining to the DON ERP, several natural and cultural protection laws should be considered at each step of the ER process. For example, field investigations may need to be scheduled to prevent disruption of marine mammals that are mating in, at, or adjacent to a CERCLA site; certain remedial options may be precluded or selected because they could harm or benefit an endangered species. Remedial Project Managers (RPMs) should consult with the natural and cultural resource personnel at each facility to ascertain information regarding any potential impacts and/or requirements specific to ER work performed at the facility. It is also important for RPMs to understand that under CERCLA §121(e), no federal, state, or local permit is required for on-site CERCLA response actions.

#### **National Historic Preservation Act**

The [National Historic Preservation Act](#) (NHPA) of 1966 was intended to help prevent the loss of irreplaceable historic properties. The act establishes the Advisory Council on Historic Preservation and authorizes the Secretary of the Interior to maintain a National Register of Historic Places. The National Register lists sites, districts, buildings, structures, and objects of significance in United States history.

Section 106 of the NHPA requires a federal agency to take into account the effect any proposed “undertaking” may have on historic properties prior to the expenditure of any federal funds. Section 110 of NHPA requires each federal agency to establish a program to locate, inventory, nominate, and protect all properties, listed or eligible for listing, on the National Register.

The term “undertaking” covers a broad range of activities including construction, rehabilitation and repair projects, demolition, licenses, permits, grants, and federal property transfers. Thus, the NHPA should be evaluated as an ARAR.

#### **Native American Graves Protection and Repatriation Act**

The [Native American Graves Protection and Repatriation Act](#) (NAGPRA), passed in 1990, sets forth a process for returning, upon request, certain human remains and other cultural items to American Indians, Native Hawaiians, and Native Alaskans that are presently held by federal agencies or federally-assisted museums or other institutions. NAGPRA defines “cultural items” as human remains, funerary objects, sacred religious objects, and cultural patrimony, defined as material remains of historical, traditional, or cultural importance, to a Native American group or culture. Although encountering such remains or objects is not a regular occurrence during ER, it is important for RPMs to be aware of the provisions in NAGPRA.

## **Archeological Resources Protection Act of 1979**

The [Archeological Resources Protection Act](#) (ARPA) requires issuance of permits for authorized professional excavation or removal of archeological resources. An archeological resource is any material remains of human life or activity that is at least 100 years old and is of archeological interest. ARPA imposes civil and criminal penalties for unauthorized excavation, removal, damage, alteration, or defacement of archeological resources, or attempts to perform such unauthorized acts. Archeological sites can be placed on the National Register of Historic Places if listing criteria are met. This is not expected to be a common issue on DON ERP sites; however, RPMs should be aware of the provisions in ARPA.

## **American Indian Religious Freedom Act**

The [American Indian Religious Freedom Act](#) (AIRFA) was enacted in 1978 (amended 1994) and requires federal agencies to consult with native traditional religious leaders and to consider, but not necessarily defer to, Indian religious values. Federal agencies also should permit access to religious sites, when possible. This is not expected to be a common issue on DON ERP sites; however, RPMs should be aware of the provisions in AIRFA.

## **Endangered Species Act**

The [Endangered Species Act](#) (ESA) of 1973 provides broad protection for species of fish, wildlife, and plants which are listed as threatened or endangered. RPMs shall consult with their natural resource managers and environmental counsel on a case-by-case basis to determine if the ESA is applicable to a site or is an ARAR. Further advice from counsel is needed when navigating the nuances of biological surveys, assessments, and opinions, or during the determination of whether formal or informal consultation is warranted. The ESA makes provisions for listing species, as well as for recovery plans and the designation of critical habitat for listed species. The ESA outlines a process for federal agencies to follow when taking actions that may jeopardize listed species and contains exceptions and exemptions. The ESA requires that individuals or agencies that undertake actions that could result in the “taking” of an endangered or threatened species perform a biological assessment in consultation with the appropriate stakeholders to evaluate potential impacts. Under ESA, “taking” includes harassing, harming, pursuing, hunting, shooting, wounding, trapping, killing, capturing, or collecting.

## **Marine Mammal Protection Act**

The [Marine Mammal Protection Act](#) (MMPA) was enacted in 1972 and forbids “taking” of a marine mammal without first obtaining a permit. For on-site CERCLA response actions, no permits are required; however, RPMs should consider the substantive provisions of the MMPA when evaluating remedial strategies. The term “take” is statutorily defined to mean “to harass, hunt, capture, or kill, or attempt to harass, hunt, capture or kill any marine mammal.”

### **1.2.3 Pollution Prevention Laws**

#### **Clean Air Act**

The [Clean Air Act](#) (CAA) was enacted in 1970, with amendments passed in 1977 and 1990. The CAA addresses criteria pollutants, hazardous air pollutants (HAPs), and risk management planning. Criteria pollutants include ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, and particulate matter. HAPs include 188 compounds that significantly contribute to cancer and other health risks from breathing air. Risk management planning programs are intended to minimize the risk of catastrophic releases of toxic chemicals from industrial operations.

EPA established National Ambient Air Quality Standards for criteria pollutants. Any area or region that does not achieve these national standards is required to develop and implement a plan to reduce

emissions to a level that will allow the area to attain the standards. Local and state agencies have authority to regulate stationary sources such as boilers and incinerators. The federal government is responsible for regulations related to mobile sources such as cars, trucks, and earth-moving equipment.

HAPs are regulated by a series of regulations known as [National Emission Standards for Hazardous Air Pollutants](#) (NESHAP). NESHAP standards regulate emissions from specific industrial categories and sources such as aerospace facilities and shipyards. There is also a NESHAP for site remediation activities; however, the standard exempts site remediation projects conducted under CERCLA and RCRA authority. Certain voluntary remediation projects are regulated by the site remediation NESHAP. Local CAA regulations, NESHAP standards, and risk management planning regulations could potentially be identified as ARARs under CERCLA.

### **Clean Water Act**

The [Clean Water Act](#) (CWA), originally enacted as the Federal Water Pollution Control Act Amendments of 1972, has the goal of protection and maintenance of the chemical, physical, and biological integrity of the nation's waters. Specific provisions of CWA include:

- Requirements for permitting point source discharges in navigable waters (National Pollution Discharge Elimination System permit program);
- Requirements for permitting of non-point discharges such as discharges from industrial and construction sites;
- Requirements for pretreatment of certain discharges to publicly-owned waste treatment facilities;
- Requirements for disposal of dredged or fill materials into navigable waters; and
- No discharges of oil or hazardous substances into or upon the navigable waters of the United States, on adjoining shorelines or into or upon the waters of the contiguous zone, or which may affect natural resources belonging to, appertaining to, or under the exclusive management or authority of the United States.

Oil is defined in the CWA as oil of any kind or in any form, including, but not limited to, petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil. The CWA definition of "navigable waters" is extremely broad and includes most surface waters and wetlands. State and local water quality standards and water quality criteria could potentially be identified as ARARs at DON ERP sites, including UST or other petroleum-contaminated sites.

RPMs must comply with the CWA requirements when DON ERP actions create the need for water management and/or discharges (e.g., construction nuisance water and ex situ water treatment).

### **Safe Drinking Water Act**

The [Safe Drinking Water Act](#) (SDWA) enacted in 1974, is primarily responsible for regulating standards of drinking water supplied by public systems. The SDWA also authorizes allowable concentrations for specified pollutants in drinking water and provides for source water protection programs. EPA's implementation of regulations establishes National Primary and Secondary Drinking Water Regulations.

Maximum contaminant levels (MCLs) established by EPA for selected compounds may be appropriate goals for contaminated groundwater cleanups (see EPA [Presumptive Response Strategy and Ex Situ Treatment Technologies for Contaminated Groundwater at CERCLA Sites, Final Guidance](#) [Office of Solid Waste and Emergency Response [OSWER] 9283.1-12]). The SDWA also has a "Right to Know" provision

which states that the public shall be informed of any contamination to the drinking water supply above MCLs.

### **National Environmental Policy Act**

The [National Environmental Policy Act](#) (NEPA), enacted in 1969, requires federal agencies to:

- Consider and document the reasonably foreseeable environmental impacts of a proposed action;
- Ensure that the public is fully informed of the proposed action; and
- Give the public adequate opportunity to comment on the proposed action.

NEPA does not apply to actions taken in accordance with CERCLA and the NCP. Like NEPA, CERCLA and the NCP establish a decision-making process with respect to the cleanup of past contamination that involves public notice and participation. The U.S. Department of Justice (DOJ) determined that these provisions of CERCLA, enacted into law after NEPA, are the functional equivalent of the NEPA process. Accordingly, compliance with the requirements of CERCLA satisfies NEPA's twin objectives of informed decision making and public participation. See Chapter 10 of [OPNAV M-5090.1](#) and Chapter 12 of [MCO P5090.2A](#) for a discussion of DON policy related to NEPA.

#### **1.2.4 Executive Order Authority**

EOs are official documents, numbered consecutively, through which the President of the United States manages the operations of the federal government. The text of EOs appears in the daily Federal Register (FR) as each EO is signed by the President and received by the Office of the Federal Register. The EOs relevant to the DON ERP are available on the [Guidance, Policy, and Regulations](#) page of the NAVFAC ERB website.

The following EOs are presented as background information to RPMs on how the DON ERP responsibilities were delegated from the President to the individual military departments, including DON. Some of these EOs have direct applicability to the DON ERP and others are presented as information to be considered during the management of ER projects.

#### **Executive Order 12088: Federal Compliance with Pollution Control Standards**

[EO 12088](#) (43 FR 47707) requires the cooperation of federal agencies with EPA, state, and local authorities to prevent, control, and abate environmental pollution. It provides that the head of each federal agency is responsible for compliance with "applicable and substantive control standards." It also provides that any dispute between EPA and a federal agency regarding environmental violations shall be turned over to the Office of Management and Budget (OMB) for resolution.

#### **Executive Order 12580: Superfund Implementation**

[EO 12580](#) (52 FR 2923) delegates authority to implement most CERCLA provisions to a number of federal agencies. Although the NCP describes EPA's procedures for implementing CERCLA, this order delegates authority and responsibility to DoD for responses at or from DoD sites.

#### **Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations**

[EO 12898](#) (59 FR 7629) requires federal agencies to identify and address the potential for their programs, policies, and actions to disproportionately and adversely affect human health or the environment in minority or low-income populations.

The DoD [Strategy on Environmental Justice](#) states that RABs and Community Involvement Plans (CIPs) (formerly known as Community Relation Plans [CRPs]) are sources for implementation of environmental



justice principles. Therefore, DON ERP activities should focus on identifying the impact of program activities on minority and low-income populations via site-specific studies, promoting partnerships with community stakeholders, encouraging minority and low-income population participation in decision-making processes, and strengthening CIPs. RPMs should be aware of the provisions of EO 12898 and the potential to use RABs and CIPs as a means to implement environmental justice principles.

#### **Executive Order 13016: Amendment to Executive Order 12580 Concerning Exercise of Authority under CERCLA §106**

[EO 13016](#) (61 FR 45871) amended EO 12580 by expanding the delegation of Presidential authority to issue orders or seek judicial relief to address releases that may present an imminent and substantial endangerment to the public health or environment. Prior to this amendment, such enforcement authority was limited to the Administrator of EPA and to the United States Coast Guard (USCG). EO 13016 amended EO 12580 by delegating CERCLA §106 authority, where appropriate, to the Departments of Agriculture, Commerce, Defense, Energy, and Interior. These departments, referred to as Federal Resource Managers, have the authority under CERCLA §106 to issue administrative orders or seek judicial relief with respect to the release or threatened release of a hazardous substance affecting either natural resources under the manager's trusteeship or a vessel or facility subject to the manager's jurisdiction, custody, or control.

EO 13016 authorizes DoD to issue a CERCLA §106 order to require a PRP to perform a response action where there has been a release or threatened release of hazardous substances affecting either natural resources under DoD trusteeship or a vessel/facility subject to DoD jurisdiction, custody, or control and subject to concurrence by EPA or the USCG depending upon where the release/threatened release occurred. If the PRP does not consent to the order, DoD may ask DOJ to seek judicial enforcement of the order. If the PRP consents to conduct remedial action (RA), DoD may work with DOJ to memorialize the settlement in a judicial consent decree. DoD always has the option to conduct the cleanup itself and seek financial reimbursement through the courts or seek a judicial order to enforce a DoD-issued CERCLA §106 order.

If a situation arises where a release or threatened release by a non-federal party affects a DON installation, RPMs shall consult with NAVFAC counsel who should then consult with the Associate General Counsel (Litigation)/Navy Litigation Office (AGC[Litigation]/NLO) for assistance on a case-by-case basis, including the evaluation of the exercise of CERCLA §106 authority.

#### **Executive Order 13693: Planning for Federal Sustainability in the Next Decade**

[EO 13693](#) (80 FR 15869) demonstrates the commitment of federal government to continue enhancing the sustainability of federal agencies. It requires federal agencies to establish greenhouse gas (GHG) emission reduction goals through 2025. This EO extends many quantitative sustainability goals that were set by previous EOs 13423 and 13514 through FY2025, and requires each federal agency to develop, implement and annually update a Strategic Sustainability Performance Plan. EO 13693 rescinds the previous EOs 13423 and 13514.

### **1.2.5 State “Mini-Superfund” Laws**

Many states have laws that are analogous to CERCLA. Although CERCLA does not enable delegation of the Superfund program to the states, under CERCLA §120(a)(4), state laws concerning removal, RA, and enforcement apply to federal facilities not listed on the NPL. State laws shall be consistent with CERCLA in order to apply to federal facilities. To be consistent, state laws shall: set out a comprehensive scheme for remedial enforcement; establish health-based standards through the ARAR evaluation process; include cost-effectiveness as an element; and be free of discriminatory application to federal facilities.

### **1.2.6 Legal Agreements**

DON's use of a team approach to ER is reflected in its partnerships with various stakeholders. These stakeholders include installation residents, local communities, Native American tribes, or other governing bodies. DON's partnership approach is to involve these stakeholders early in the project to create a team-like atmosphere towards project execution. Legal agreements are required and/or used to formalize the commitment by DON and various stakeholders, including regulatory agencies, to response action requirements.

Negotiated legal agreements include those requirements that have been agreed to by DON and a regulatory authority, and have an established procedure for specifying deadlines for actions to be accomplished. Legal agreements, as used in this Manual, also include unilateral court orders with enforceable deadlines. Legal agreements are a subset of legal requirements, which are all applicable federal, state, interstate, and local statutory and regulatory requirements, both substantive and procedural, and include those requirements contained in statutory, mandated, or authorized documents such as permits, judicial or consent decrees, compliance orders, or cleanup agreements.

The provisions of negotiated legal agreements are both a factor in setting project execution priorities through risk management and a tool for formalizing DON commitments. DON supports the use of negotiated legal agreements as a means of setting project milestones. All legal agreements negotiated shall reflect relative risk and DON ERP funding controls (see Section 4.1 for discussion on funding and site prioritization). Enforceable milestones in negotiated legal agreements shall fit within the budget and defense plan controls for future years. All new negotiated legal agreements shall include provisions for rolling milestones. Rolling milestones link specific cleanup actions to the availability of funds in a given budget year, and should be displayed in a Site Management Plan (SMP) and not in the body of the agreement.



## Chapter 2

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### DoD/DON Organization, Roles, and Responsibilities

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RPMs manage ER projects under authorities granted by the President of the United States through EOs. The primary governmental entities that may be involved in the cleanup of past contamination on any DON installation are DON (represented at the project level by the RPM), EPA, and the respective state. DON is responsible for the execution of its DON ERP with guidance from OSD. This chapter summarizes the organizational responsibilities of each of these participants in the DON ERP, and is intended to provide RPMs with the organizational context within which their responsibilities are executed.

#### 2.1 Department of Defense

In accordance with [EO 12580](#), DoD is the lead agency for actions taken under the authority of CERCLA at DoD installations. This order also delegates authority for response action decisions to the SECDEF “...with respect to release or threatened releases where either the release is on, or the sole source of the release is from any facility or vessel under the jurisdiction, custody, or control of DoD” (EO 12580, 52 FR 2923, 3 CFR Part 1987 Comp. p.193, as amended by EO 12777, 56 FR 54757, and 3 CFR Part 1987 Comp., p. 123).

SECDEF also has responsibilities under CERCLA §§105, 109, 111, 116, and 122 (see 42 USC §§9605, 9609, 9611, 9611 and 9622). The DERP requires that SECDEF identify an office within OSD to carry out the ERP (10 USC §2701 (a)). The SECDEF has delegated ERP implementation responsibility to the Assistant Secretary of Defense (Energy, Installations, and Environment) (ASD[EI&E]).

ASD(EI&E) is the focal point for DoD-wide environmental policy and planning. ASD(EI&E) represents DoD before Congress, federal and state agencies, news media, and the public in environmental matters. ASD(EI&E) is responsible for policy, management, and oversight of the DERP. ASD(EI&E) responsibilities include the following:

- Provide interface with Congress, regulators, other federal agencies, and the public for DoD-wide implementation of the requirements of the NCP;
- Provide policy for and oversight of the overall DERP; and
- Develop and publish the [DERP Manual](#) which outlines program goals, and the Annual Report to Congress.

The DERP is funded by Congressional appropriation each year. Congress funds the Defense Environmental Restoration Account, which in turn supplies funding to each of the military service ERPs (e.g., the ER,N account for the active installation DON ERP). A separate Congressional appropriation is used to manage all BRAC facility issues, including ER. DERP generally follows the same process at both active and BRAC installations.

#### 2.2 Department of the Navy Leadership

Within DON, many organizations, commands, activities, and personnel work together to execute and manage the DON ERP, as shown in Figure 2-1. The following subsections provide descriptions of these entities and their interactions.

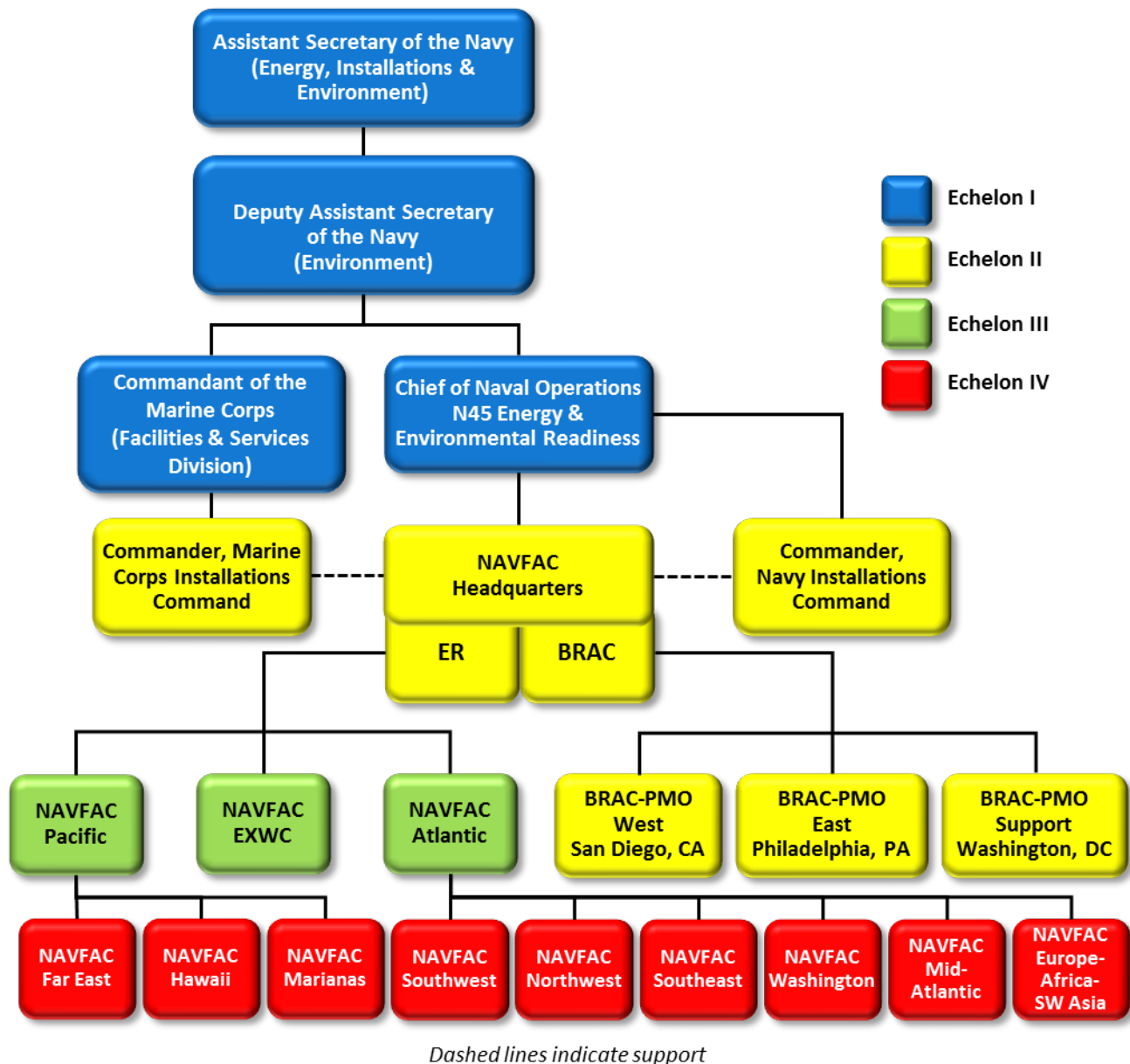


Figure 2-1 DON ERP Organization

### 2.2.1 Assistant Secretary of the Navy (Energy, Installations, and Environment)

The Assistant Secretary of the Navy (Energy, Installations, and Environment) (ASN[EI&E]) is the Secretary of the Navy's (SECNAV's) designated focal point for all matters related to DON installations and environmental matters and policy. Within ASN(EI&E), the Deputy Assistant Secretary of the Navy (Environment) (DASN[E]) is responsible for all matters related to the DERP. DASN(E) duties include coordination with the ASD(EI&E) on policy issues and ultimate responsibility for the DON ERP. The DASN(E) also is responsible for the following:

- Interfacing with ASD(EI&E), Congress, regulators, and the public on DON specific issues;
- Forwarding issues of common interest to all services to ASD(EI&E);

- Formulating ASN budget guidance commensurate with the [DERP Manual](#);
- Providing policy and oversight of the DON program; and
- Signing Federal Facility Agreements (FFAs) and Interagency Agreements after appropriate coordination with and endorsement by the chain of command. The chain of command for FFAs and Interagency Agreements pertaining to Navy installations is via NAVFAC, and Chief of Naval Operations, Energy and Environmental Readiness Division (CNO N45). The chain of command concerning Marine Corps installations and activities is via NAVFAC and Commandant of the Marine Corps (Facilities and Services Division) (CMC[LF]).

### **2.2.2 Chief of Naval Operations N45 Energy and Environmental Readiness**

CNO N45 directs, coordinates, and monitors the DON ERP. As the resource and assessment sponsor for the DON ERP, CNO N45 is responsible for obtaining appropriate funding levels required to execute the DON ERP through the resource planning, assessment and programming process within the DON Program Objective Memorandum (POM) process. In addition to acting as resource sponsor, CNO N45:

- Provides planning and programming on environmental matters;
- Provides overarching DON policy and guidance on environmental issues;
- Coordinates with other DON offices and other federal agencies; and
- Provides oversight of the DON ERP.

### **2.2.3 Commandant of the Marine Corps (Facilities and Services Division)**

CMC(LF) has delegated most of the responsibilities for planning, programming, and executing the DON ERP at Marine Corps installations to CNO N45 and NAVFAC. However, CMC(LF) does provide oversight for the implementation of the DON ERP at Marine Corps installations and coordinates with ASN(EI&E), CNO N45, and NAVFAC on ER matters and policies.

## **2.3 Naval Facilities Engineering Command**

NAVFAC is the DON Systems Command and technical authority for facilities engineering and management, real estate, and construction. It is responsible for the acquisition, construction, operations and maintenance (O&M), and when no longer needed, disposal of the DON's shore infrastructure. NAVFAC Headquarters (HQ) manages and executes the DON ERP through Echelon III NAVFAC Atlantic and Pacific (FACs), Echelon IV Facilities Engineering Commands (FECs), BRAC Program Management Office (BRAC PMO), and the Engineering and Expeditionary Warfare Center (EXWC) located throughout the United States as shown on Figure 2-2.

NAVFAC HQ responsibilities include:

- Managing and executing the DON ERP, which consists of the active installation ER,N and BRAC programs;
- Providing NAVFAC-wide ER policy, guidance, and metrics;
- Submitting the DON ERP budget as the Budget Submitting Office;
- Providing program and technical support;
- Developing and supporting ER,N and BRAC resource requests, and managing funds allocated for program execution; and

- Providing ER-related training to FECs in coordination with the Civil Engineer Corps Officer School (CECOS), Naval Facilities Institute, and EXWC.

The [NAVFAC Portal](#) provides further information about the NAVFAC organization.

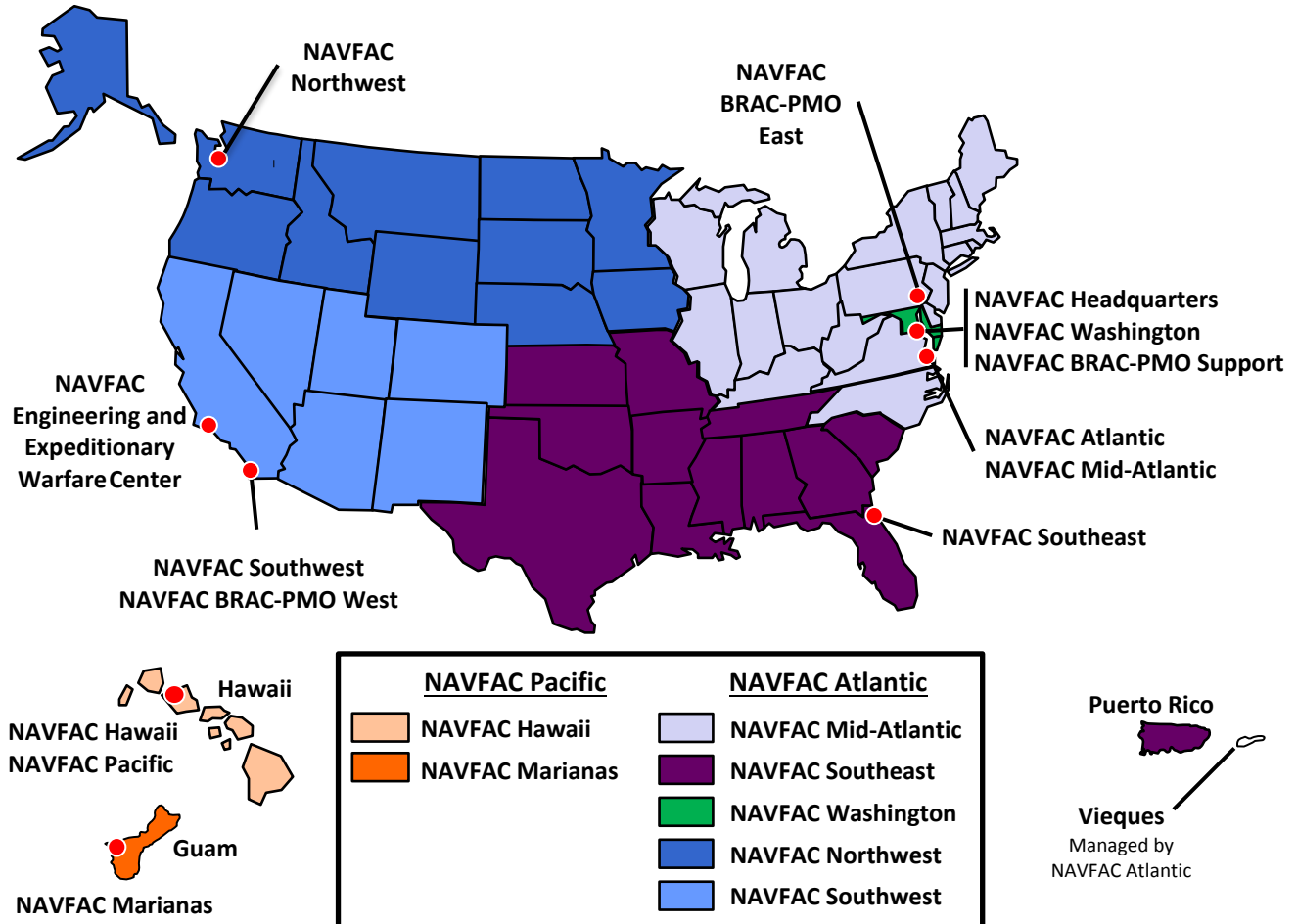


Figure 2-2 NAVFAC Areas of Responsibility for DON ERP

### 2.3.1 NAVFAC Commands/Facilities Engineering Commands

NAVFAC is aligned to provide easy access and support to the Fleets, Commander, Navy Installations Command (CNIC), and Regional Commanders by establishing strategically-located field commands. Two primary NAVFAC Field Commands are subordinate to NAVFAC HQ: NAVFAC Atlantic and NAVFAC Pacific. These facilities, also known as FACs, are located within close proximity to the Atlantic and Pacific Fleet HQ. These FACs interface with the Atlantic and Pacific Fleets as well as the United Fleet Forces Command and provide forward deployed engineering support to CNIC and the Fleets. FECs are regional subordinate commands under NAVFAC Atlantic and NAVFAC Pacific providing environmental engineering, technical, legal, and contracting assistance to installations within their respective geographic areas. FECs also provide regional engineer support to Regional Commanders and RECs. FECs report to NAVFAC Atlantic or NAVFAC Pacific, as follows:

### **NAVFAC Atlantic (Norfolk, Virginia)**

- NAVFAC Mid-Atlantic (Norfolk, Virginia)
- NAVFAC Southeast (Jacksonville, Florida)
- NAVFAC Washington (Washington, DC)
- NAVFAC Southwest (San Diego, California)
- NAVFAC Northwest (Silverdale, Washington)
- NAVFAC Europe (Naples, Italy) (no DON ERP involvement)

### **NAVFAC Pacific (Pearl Harbor, Hawaii)**

- NAVFAC Hawaii (Pearl Harbor, Hawaii)
- NAVFAC Marianas (Guam, Marianas Islands)
- NAVFAC Far East (Yokosuka, Japan) (no DON ERP involvement)

FEC areas of responsibility are shown in Figure 2-2. Each FAC and FEC has an ER Manager who has ultimate responsibility for the successful coordination and execution of the DON ERP and key responsibilities within their geographical area. The ER Manager's mission is to support the commanding officers (COs) in the areas they serve, and implement the policies, guidance, and directives of their respective FAC or FEC, NAVFAC HQ, DON, and DoD as they relate to the DON ERP. One of the ER Manager's most important responsibilities is to identify and secure resources, including funding, staffing, and equipment, required for the successful execution of the DON ERP within their respective FAC or FEC. Key responsibilities of NAVFAC Atlantic and NAVFAC Pacific, as implemented by the FECs, include the following:

- Managing and executing the DON ERP at installations;
- Coordinating with the installation and regulatory agencies prior to initiating projects and during all phases of the DON ERP;
- Communicating and coordinating DON ERP status and activities with the installation, including ensuring that land use controls (LUCs) are implemented and monitored;
- Communicating and coordinating within DON, with other federal agencies, PRPs, and stakeholders;
- Providing support to NAVFAC HQ to respond to inquiries by DoD, ASN, CNO, Commandant of the Marine Corps (CMC), or Congress; and
- Providing budget estimates and program management functions including updates to the DON ERP "Normalization" of Environmental Data Systems (NORM) budgeting database and cost-to-complete (CTC) estimates with supporting documentation for future cleanup requirements.

### **2.3.2 Base Realignment and Closure Program Management Office**

The NAVFAC BRAC PMO is the DON's integrated program management office for all BRAC-related efforts, including management of the cleanup and disposal of Navy and Marine Corps bases closed by the BRAC process. The BRAC PMO was established to streamline the BRAC disposal process and to direct BRAC execution and resources. Primary functions of the BRAC PMO within the DON ERP include the following:

- Establishing property disposal strategies and establishing cleanup levels to facilitate property disposal;
- Directing, reviewing, and approving the base-specific plans, schedules, and requirements for environmental cleanup documentation and actions;
- Establishing priorities and directing, reviewing, and approving the environmental cleanup actions in coordination with property disposal; and
- Serving as the primary DON interface with environmental regulators regarding BRAC Cleanup Plans (BCPs) and actions in coordination with the DASN(E).

#### **2.3.2.1 Base Realignment and Closure Environmental Coordinators**

In addition to all of the CO responsibilities listed in Section 2.4.3, BRAC Environmental Coordinators (BECs) within the BRAC PMO are responsible for the following actions:

- Maintaining contact with the appropriate EPA Regional Office and state environmental regulatory agency and forming/leading the BRAC Cleanup Team (BCT);
- Ensuring a BCP that supports the Community Reuse Plan is prepared and updated as needed, with all environmental cleanup programs related to closure implemented in accordance with the BCP;
- Serving as the Program Manager where the installation has an FFA, Federal Facility State Remediation Agreement (FFSRA), Interagency Agreement, or other regulatory cleanup agreement, order, or decree in place;
- Acting as the liaison/coordinator with appropriate installation commanders, the DoD Base Transition Coordinator, NAVFAC HQ components, and the community with regard to closure-related environmental compliance matters;
- Establishing and maintaining the Administrative Record (AR) and public participation procedures required under CERCLA, including serving as co-chair of the RAB;
- Identifying resource requirements for cleanup and abatement actions, and providing project oversight; and
- Signing uncontaminated parcel determinations under the CERFA.

#### **2.3.3 Naval Facilities Engineering and Expeditionary Warfare Center**

NAVFAC EXWC, located at Naval Base Ventura County, Port Hueneme, California, provides specialized expertise in the development, evaluation, and application of innovative remediation approaches and technologies to facilitate site closeouts. NAVFAC EXWC provides a variety of technical support to the project managers at NAVFAC HQ, BRAC PMO, and the NAVFAC FECs. NAVFAC EXWC key roles and responsibilities include providing:

- Support during the planning and implementation phases of site investigations, remedy selections, remedial designs, and remedial action operations, including optimization of all phases, at DON ERP Sites;
- Development and transfer of technologies that directly address the most challenging issues RPMs face. NAVFAC EXWC works with RPMs to identify research, development, testing, and evaluation (RDT&E) needs, and then develops and evaluates technologies that meet those needs under RDT&E programs such as the DoD's Strategic Environmental Research and Development Program (SERDP) and Environmental Security Technology Certification Program (ESTCP), and the Navy Environmental Sustainability Development to Integration (NESDI) program;

- Cost estimating assistance, including technical support for NORM CTC estimating and documentation. Third-party reviews of contractors' technical and cost proposals;
- In-person and web-conferenced technical seminars such as the Remediation Innovative Technology Seminars (RITS) delivered at each FEC location, the Environmental Restoration Training held in Port Hueneme, the Technical Insight and Problem Solving (TIPS) Forum, and the Open Environmental Restoration Resource (OER2) Webinar series;
- On-line information via NAVFAC ERB website at <http://www.navfac.navy.mil/go/erb>, Technology Transfer (T2) tools, Environmental Restoration Newsletter, and monthly e-mails publicizing up-to-date technical information, guidance, and policy; and
- Leadership and participation in every DON Environmental Restoration Workgroup and other federal agency workgroups (see Section 19.4). NAVFAC EXWC coordinates programs and issues within NAVFAC, among other DoD Services, and with non-DoD organizations.

### **2.3.4 Remedial Project Manager**

RPMs work out of the FECs or BRAC PMO and are responsible for the management of the DON ERP at the installation and/or site level. The RPM coordinates the work of DON technical support agencies and contractors to meet DON ERP goals while following all applicable policies. The RPM is the lead DON individual responsible for all aspects of site management including communications, planning, budgeting, scheduling, and controlling the study, design, remediation, and long term management (LTMgt). NAVFAC HQ has established Business Management System (BMS) processes that identify RPM roles and responsibilities for all aspects of the DON ERP. These BMS processes are located on the secure side of the NAVFAC Portal. RPMs should coordinate all actions including those that are driven by regulations outside of CERCLA with the appropriate Commander Navy Region or Marine Corps environmental media managers. RPM responsibilities include the following, but are not limited to:

- Coordinating, directing, and reviewing DON ERP site work and ensuring compliance with the NCP;
- Providing for the protection of human health and the environment, balancing the requirements of the DON mission, budget, and regulatory requirements to achieve best use of resources;
- Establishing requirements and generating auditable CTC estimates to be used for budgeting future ER projects, and maintaining an audit file;
- Representing DON with regulatory agencies and natural resource stakeholders/trustees to facilitate communications and to implement optimum, cost-effective cleanup response actions that meet applicable regulatory requirements and protect human health and the environment;
- Maintaining a close relationship with the installation to facilitate communication and recognize the installation's responsibilities for installation property, personnel, and mission, and to ensure that all LTMgt activities are accomplished and LUCs are maintained;
- Maintaining internal communication with the Contracting Officer (KO), appropriate counsel, and the cognizant NAVFAC construction field office during response actions;
- Coordinating external communication with regulatory agencies and the public during response actions; and
- Providing proactive technical and contract oversight. Performing contract administration activities including maintaining files of all contractor submittals related to and supporting response action conclusions, and supporting or serving as the Task Order Contracting Officer's Representative (TO COR) including all Contracting Officer's Representative (COR) duties.

Additional RPM duties at BRAC installations involve being a member of the BCT. The RPM's involvement with ongoing and planned restoration program activities is important to the BCT, and the RPM needs to keep the BCT informed of such program activities. Knowing the scope of planned and ongoing program activities and the contracts driving them will facilitate the project team's understanding of the mechanisms and resources available to implement ER at the installation.

### **2.3.5 NAVFAC Workgroups**

NAVFAC has established various workgroups to help NAVFAC HQ and the ER Managers address difficult technical issues and assist with guidance development. Workgroup members consist of representatives from each NAVFAC FEC and FAC, BRAC PMO, NAVFAC HQ, NAVFAC EXWC and an ER Manager. In addition to NAVFAC members, certain groups also have representatives from CMC, CNO, Naval Sea Systems Command (NAVSEA) (Explosive Ordnance Disposal Technology Division [EODTECHDIV] and Naval Ordnance Safety and Security Activity [NOSSA]), Naval Sea Systems Command Detachment Radiological Affairs Support Office (NAVSEADET RASO), Navy and Marine Corps Public Health Center (NMCPHC), Office of Naval Research (ONR) and Space and Naval Warfare Systems Command (SPAWAR) as needed to provide expertise. Current information on these workgroups and programs can be found on the [NAVFAC ERB website](#).

#### **2.3.5.1 Environmental Restoration Managers Group**

The ER Managers work as the board of directors for the DON ERP chaired by the Director of the ER Division at NAVFAC HQ. They provide direction and formulate policies on how to effectively administer the program. The group is composed of ER Managers from NAVFAC HQ, BRAC PMO, NAVFAC Atlantic and Pacific, NAVFAC EXWC, and NAVFAC FECs.

The ER Managers provide guidance on all issues affecting the program, including:

- Policy Issuance;
- Budget/Execution/Funding;
- Contracting;
- Business Practices;
- Workforce Planning;
- Technical Problems; and
- Regulatory Issues.

The ER Managers establish individual NAVFAC workgroups to address high priority issues in a consistent manner across NAVFAC. An ER Manager sits on each of the individual NAVFAC Workgroups and monitors performance. The ER Manager acts as a link, by providing leadership to the workgroup and by receiving feedback from the workgroup on technical issues or other limitations facing RPMs. Guidance documents, policy suggestions, and issue papers are often developed by workgroups and brought to the ER Managers for consideration.

#### **2.3.5.2 Alternative Restoration Technology Team Workgroup**

The Alternative Restoration Technology Team (ARTT) Workgroup was established to promote the use of practical, cost-effective, and innovative technologies and methodologies in the DON ERP. The ARTT carries out its charter by fostering partnerships, supporting research and T2, and encouraging participation in NAVFAC-wide efforts.



## **Products and Services**

- Exchange scientific information and share lessons learned during project updates about innovative technologies and approaches;
- Share information so that RPMs can benefit from the experiences of others within NAVFAC;
- Work closely with other NAVFAC workgroups, ONR, Interstate Technology and Regulatory Council (ITRC), EPA, United States Geological Survey (USGS), and other DoD organizations to identify, evaluate, and break down barriers to using new technologies;
- Provide input from the end users' perspective on environmental technology needs across the FECs;
- Provide input and demonstration site suggestions for DoD's ESTCP proposals as well as participation in DoD's SERDP final project briefings;
- Submit input to the NESDI Program and assist in prioritizing future ER technology needs;
- Participate in production of handbooks, fact sheets, web-based multimedia learning tools, monthly T2 e-mails and OER2 webinars;
- Implement an annual T2 survey as a feedback mechanism to guide future T2 products;
- Ensure training courses and seminars provided to RPMs, such as the RITS, include the most recent and promising technological advances; and
- Provide technical expertise on cleanup review Tiger Teams that are often initiated at sites that have high potential cleanup costs, high visibility, or would benefit from a global NAVFAC perspective.

### **2.3.5.3 Naval Installation Restoration Information Solution Workgroup**

The Naval Installation Restoration Information Solution (NIRIS) Workgroup develops, improves, and maintains business practices, guidance, and solutions to effectively acquire, steward, and share data and documents to support the DON ERP. The NIRIS Workgroup also acts as the formal configuration control board for all data and processes used within NIRIS. While the NIRIS Workgroup is primarily focused on supporting ER RPMs across NAVFAC, it also strives to engage other Workgroups and system end users to ensure ER information can be effectively shared and used across the entire NAVFAC community.

The primary goal of the workgroup is to ensure that ER data and records are accessible via NIRIS across the NAVFAC Enterprise.

## **Products and Services**

- Create, upgrade, and maintain NIRIS applications;
- Provide end-user operational support;
- Manage NIRIS end-user and system administration modules;
- Maintain data management;
- Maintain records management;
- Provide training and outreach; and
- Implement strategic planning and procedural support.

#### **2.3.5.4 Sediment Workgroup**

The Sediment Workgroup was established to ensure cost-effective, optimized remedy selection and restoration decisions for DON sediment sites. This workgroup is comprised of in-house technical experts available to RPMs to address complex sediment issues in a more cost effective and efficient manner.

The goals are to:

- Provide technical support and expertise to ER Managers and the DON in developing or revising sediment policy and guidance;
- Ensure implementation of DON sediment policy and guidance in a consistent manner; and
- Identify and address the primary issues and challenges facing DON sediment sites with respect to characterization, remediation, and monitoring.

#### **Products and Services**

- Maintain an inventory of DON sediment sites;
- Develop products, tools, and guidance that provide clear and consistent approaches to investigate and remediate sediment sites;
- Promote the use of innovative remedies where appropriate;
- Serve as a resource to share information among sediment RPMs and provide technical support within the DON; and
- Facilitate coordination with SERDP/ESTCP/NESDI researchers to foster pilot studies and technology demonstrations on DON sediment sites.

#### **2.3.5.5 Munitions Response Workgroup**

The Munitions Response (MR) Workgroup promotes the use of best available technologies and methodologies for managing cleanup of MEC and MC, with the ultimate goal of reducing explosives hazards and environmental risks in a cost-effective and timely manner. In addition to NAVFAC representatives, members of the MR Workgroup include representatives from CNO N45, CMC, NOSSA and Naval Surface Warfare Center Indian Head Explosive Ordnance Disposal Technology Division (NSWC IHEODTD).

#### **Products and Services**

- Identify programmatic and project barriers related to the implementation of the MRP;
- Recommend procedures and guidance on DON munitions-related restoration issues;
- Support RPM MR training;
- Identify technology needs and requirements to improve implementation of the MRP;
- Participate with RDT&E programs; and
- Provide success stories and lessons learned to assist other RPMs implementing MRP projects.

#### **2.3.5.6 Risk Assessment Workgroup**

The Risk Assessment Workgroup (RAW) was established to provide support in the areas of ecological risk assessments (ERAs) and human health risk assessments (HHRAs) with a focus on environmental monitoring, research and development (R&D), VI, and emerging contaminants (ECs). In addition to NAVFAC representatives, this workgroup has representatives from NMCPHC, SPAWAR, ONR, and NAVSEA.

## **Products and Services**

- Evaluate and recommend strategies to resolve difficult technical issues in risk assessment including:
  - ECs;
  - Development and use of background contaminant ranges;
  - Integration of natural resource injury (NRI) issues into the CERCLA process;
  - Design of strategies for ecological monitoring;
  - Analysis of PCBs; and
  - Addressing VI (indoor air).
- Develop guidance and issue papers on risk assessment topics;
- Evaluate information and innovative strategies developed at individual facilities for future use in other parts of the country; and
- Review risk assessment-related proposed R&D projects for technical accuracy and timeliness and recommend projects for funding.

### **2.3.5.7 Optimization Workgroup**

The Optimization Workgroup was created to address emerging needs to research, evaluate, and provide assistance with applying optimization throughout the DON ERP. The goal of this workgroup is to aid in achieving efficient, protective, and cost-effective Site Closeout (SC). Where sites cannot reach SC, the focus is on maintaining protectiveness standards at the lowest cost.

## **Products and Services**

- Develop guidance that provides clear and consistent approaches to optimization and SC;
- Support integration of green and sustainable remediation (GSR) analysis into NAVFAC optimization reviews;
- Track DON lessons learned for obtaining cost-effective Remedial Action Operation (RA-O) and LTMgt contract services;
- Share information about optimization strategies through team member updates and disseminating information throughout NAVFAC;
- Develop and update case studies, course material, website information, conference presentations, and other products for RPMs;
- Communicate NAVFAC optimization policy and guidance to RPMs;
- Support optimization and GSR tracking within the Optimization Module of NORM;
- Collaborate with other federal and state groups focusing on optimization;
- Participate in optimization review efforts throughout NAVFAC; and
- Develop tools which aid RPMs in managing LUCs.

### **2.3.5.8 Radiological Workgroup**

The Radiological Workgroup provides technical support in the management and cleanup of low level radioactive waste (LLRW) and addresses G-RAM issues at ER sites. In addition to NAVFAC representatives,

this workgroup has representatives from NAVSEADET RASO.

## **Products and Services**

- Support the development and implementation of Historical Radiological Assessments (HRAs);
- Develop guidance for RPMs to optimize investigation approaches for G-RAM contamination that are cost effective and defensible;
- Develop budgeting tools that address radiological assessment and remediation costs for NORM and contract administration;
- Provide success stories and lessons learned to assist RPMs involved with G-RAM issues;
- Provide input for training on G-RAM issues; and
- Participate with RDT&E programs to address technology needs related to G-RAM issues.

### **2.3.6 Contracting Officer**

The KO is appointed by warrant and given the authority to execute contractual documents that obligate the government within the authority of the warrant. This person has the authority to enter into, administer, and/or terminate contracts and make related determinations and findings. The terms of the warrant may include certain authorized representatives of the KO acting within the limits of their authority as delegated by the KO. This individual also may be titled Procuring Contracting Officer (PCO). The KO will often designate individuals with authority to issue individual task orders (TOs), usually FEC contract specialists with warrants. Contract specialists at a FEC will assist the KO in preparing and administering contracts.

Key KO responsibilities are as follows:

- Appointing a COR or TO COR and issuing their appointment letters;
- Appointing the ordering officers;
- Issuing requests for proposals (RFPs) and receiving proposals;
- Preparing Pre/Post-Negotiation Memoranda and leading negotiations;
- Awarding the contract or TO;
- Delegating Administrative Contracting Officer (ACO) duties, if desired;
- Serving as Award Fee Board Member; and
- Performing a periodic review of COR qualifications and COR files.

The PCO is responsible for the delegation of authority to the ACO. It is the responsibility of the PCO to ensure all members of the contract management team fully understand the authority, responsibility, and expectations that are delegated to them.

The ACO is a KO designated in writing by the KO, who administers contracts. The ACO function may reside with a contract specialist with a warrant. The KO determines exactly which duties to assign to the ACO on a case-by-case basis.

#### **2.3.6.1 Contract or Task Order Contracting Officer's Representative**

The COR is a DoD military member or DoD civilian employee designated and authorized in writing by the KO. The COR conducts contractor surveillance to verify that the contractor is fulfilling contract delivery and quality requirements and to document performance for the contract record. The DON ERP

implements the majority of its requirements through large indefinite delivery and indefinite quantity (IDIQ) contracts with multiple TOs. To ensure the necessary level of COR support to the KO in the administration of these contracts, the KO often appoints overarching COR responsibilities for the overall IDIQ to a single individual referred to as Contract COR, and COR responsibilities for a given TO to a separate individual referred to as TO COR. Only one COR shall be appointed for each contract or TO. COR duties are re-delegable only to an appointed alternate COR who may assume the duties only in the COR's absence. The COR may provide technical direction or clarification directly to the contractor when delegated and authorized in writing from the KO. The COR cannot change scope, cost, or schedule. The COR coordinates all government technical interfaces with the contractor, monitors compliance with contract and safety requirements, and inspects and accepts the services performed. In the past, the COR also has been referred to as "Contracting Officer's Technical Representative".

The TO COR is responsible to the KO, with input from the COR, for those actions specifically identified by the KO in the TO COR letter of appointment. The TO COR functions as a technical representative to assist the COR in the administration of a contract TO. Specifically, the TO COR provides technical input and helps the COR as necessary to specify tasks within the statement of work (SOW), and helps monitor and coordinate the performance of work by contractors under a TO.

Each FAC or FEC may have its own procedures for assigning TO CORs. In many cases, RPMs are appointed as TO CORs. For construction contracts, in addition to the RPM, a Resident Officer in Charge of Construction (ROICC) or Facility Engineering and Acquisition Division (FEAD) Construction Manager may be assigned as TO COR to provide safety oversight in the field. For a more detailed listing of duties associated with KO, COR, and TO COR functions, consult NAVFAC Instruction 4200.1 and the NAVFAC BMS.

#### **2.3.6.2 Technical Points of Contact or Subject Matter Experts**

Technical points of contact (TPOCs) or subject matter experts (SMEs) are government technical personnel providing assistance to a COR. TPOCs and SMEs are not formally appointed positions; however, technical experts are often required for successful oversight of contractor performance and may be used at the discretion of the appointed COR to assist in the administration, oversight, and performance assessments of a contract or task order. NAVFAC Instruction 4200.1 and the NAVFAC BMS detail the roles and responsibilities of TPOCs and SMEs.

#### **2.3.6.3 FEAD Construction Manager/Resident Officer in Charge of Construction**

The FEAD Construction Manager/Facility Support Contract Manager or ROICC is responsible for the administration of assigned construction contracts. The FEAD Construction Manager/ROICC provides oversight of construction and safety for RAs and treatability studies. In addition, they coordinate with the RPM to ensure that the work is accomplished according to plans and specifications and in a manner that protects human health, welfare, and the environment. Because the selected RAs are decisions agreed upon among DON authorities and regulatory agencies, the FEAD Construction Manager/ROICC cannot make field changes without consultation with the RPM, the COR, and the Contract Specialist.

The FEAD Construction Manager/ROICC will act as the Government Designated Authority Competent Safety Person to approve and monitor the contractor's Health and Safety Plan (HASP) and other procedures for compliance with the OSHA regulations in [29 CFR Part 1910](#) during construction in the field.

In addition to construction support, the FEAD/ROICC offices generally have dedicated environmental staff to assist with communications, coordination, and execution of the DON ERP from the installation perspective. In some cases, the FEAD/ROICC office may need to coordinate with installation environmental staff outside of its chain of command.

#### **2.3.6.4 Contractor Support for the Environmental Restoration Program**

RPMs focus on the overall site management of each project site, dictate the project direction, and ensure it is executed on schedule and within budget. Contractor personnel hired to support each ER project or site provide specialized technical support, data analysis, and reporting required during site characterization, investigation, remediation, and LTMgt.

Historically, the DON ERP contracting efforts have focused on the Comprehensive Long-Term Environmental Action, Navy (CLEAN) contracts providing professional services during the study and design phases of the DON ERP, and the remedial action contract (RAC) providing the actual remediation and O&M.

NAVFAC's environmental business line acquisition strategy provides acquisition options and flexibility and minimizes exposure to contractual risks. The acquisition strategy focuses on the development of more balanced and diversified contracting approaches to meet command-wide program requirements. The goal of the acquisition strategy is to continually match the type of work to be performed with the most cost-effective and efficient type of contractual vehicles to accomplish the mission. The NAVFAC environmental business line acquisition strategy is updated annually and is available to DON personnel from NAVFAC HQ.

NAVFAC may also use contractors for internal administrative and engineering support for the DON ERP. This type of contract support is known as Cooperative Administrative Support Unit (CASU). CASU employees can fill a variety of roles in the DON ERP. At the project level, CASU personnel can serve as environmental engineers and environmental scientists providing technical and management assistance.

CASU employees sign Non-Disclosure Agreements (NDAs) that prohibit discussion of sensitive DON issues (contractor rates, government estimates, legal documents, etc.) and their job functions differ from those of government employees in several key ways. CASU personnel cannot authorize, sign, or issue official correspondence, and although they can provide technical support to develop TOs and internal government estimates, they cannot negotiate funding of DON TOs. In addition, when CASU personnel support the DON in negotiations with regulatory agencies, PRP negotiations, or other legal situations, they can only do so with DON approval and in the presence of DON personnel. CASU contractors are prohibited from competing for project contracts issued by the government agency (e.g., CLEAN contract, RAC, Environmental Multiple Award Contract, etc.) because CASU employees may have access to sensitive DON contracting materials (though competitive information is protected under the NDA), and CASU technical support personnel would have a conflict of interest executing a project involving their company.

#### **2.3.7 NAVFAC Office of Counsel**

NAVFAC Office of the General Counsel (OGC) attorneys are assigned throughout NAVFAC, including NAVFAC HQ, NAVFAC FACs, and all FECs. OGC attorneys are the primary legal resource for the RPM on any legal matter relating to the DON ERP, including but not limited to:

- Review of documents at all stages of the CERCLA process;
- Review of ARARs;
- Negotiation of FFAs;
- Review of responses to comments;
- Review of Records of Decision (RODs) and other decision documents (DDs);
- Coordination of legal issues throughout the chain of command (internal and external); and
- ER litigation on behalf of or against the DON.

OGC Counsel assigned to NAVFAC shall be primary members of the ER team at each level of the chain of command. These legal resources should be contacted through the DON ERP chain of command for all DON property.

## **2.4 Other Support Offices**

DON specialty offices provide various areas of technical support or oversight to the DON ERP. The following subsections describe a few of the offices or commands associated with the DON ERP.

### **2.4.1 Commander, Navy Installations Command**

The mission of the CNIC is to provide consistent, effective, and efficient shore installation services and support to sustain and improve current and future fleet readiness and mission execution. CNIC provides unified and consistent procedures, standards of service, and funding to manage and oversee shore installation support to the fleet. CNIC executes delivery of installation services through its regions and installations. CNIC coordinates the DON ERP with each installation's mission and community concerns. CNIC roles at specific installations include the following:

- Acting as the installation CO's DON ERP representative;
- Expressing CNIC interest in DON ERP actions and remedy selections;
- Coordinating and reconciling Installation Master Plan/activity mission with DON ERP activities;
- Helping to identify activity or community concerns;
- Coordinating with installation CO for required signatures;
- Coordinating installation issues related to remediation work, such as access, scheduling, or recognition of natural and cultural resource issues (breeding seasons, etc.); and
- Coordinating media inquiries with Public Affairs Officers (PAOs).

### **2.4.2 Commander, Marine Corps Installations Command**

The mission of Marine Corps Installations Command (MCICOM) is to exercise command and control of Marine Corps installations via regional commanders in order to provide oversight, direction, and coordination of installation services and to optimize support to the Operating Forces, tenants, and activities. MCICOM's roles in the coordination of the DON ERP for specific installations mirrors those described for CNIC in the preceding section.

### **2.4.3 Navy and Marine Corps Installation Commanding Officer**

The DON ERP may affect the mission of an installation, the health and welfare of the people who work and live on or near the installation, and the public's attitude in neighboring communities toward an installation. Navy/Marine Corps Installation COs shall be consulted and kept fully informed of DON ERP decisions and actions taken by RPMs that may affect their installations. Their knowledge of the status of the DON ERP will assist COs in making property management decisions for all tenant activities. COs maintain close coordination with the RECs and/or regional COs and CNIC or MCICOM. The [Environmental Compliance Guide for Commanding Officers of Navy Installations](#) and [Marine Corps Commander's Guide to Environmental Management](#) provides information for COs on environmental leadership and the DON ERP. COs or their designated representatives are responsible for the following:

- Coordinating with FACs or the FECs concerning all DON ERP matters;
- Representing the installation to regulators and the public, including serving as RAB co-chair or designating a DON representative;

- Signing RODs/DDs for cleanup and removal actions under CERCLA, and DDs for CAs related to cleanup under RCRA (includes pre-operational closure documents);
- Coordinating and reconciling the Installation Master Plan/activity mission with DON ERP activities; and
- Ensuring that DON ERP site conditions are considered and conflicts are resolved prior to land use planning, development, or operations, especially in reference to military construction (MILCON).

#### **2.4.4 General Counsel**

The General Counsel is the principal legal advisor to SECNAV and has primary responsibility within DON for providing advice and counsel on environmental matters (see Paragraph 0327, U.S. Navy Regulations, [Secretary of the Navy Instruction \[SECNAVINST\] 5430.25E](#), and General Counsel memo [Subj.: Environmental Legal Services]). Within the OGC, the Office of the Assistant General Counsel (Energy, Installations, and Environment), has primary responsibility for advising the ASN(EI&E) on legal matters related to the environment. Within DON, the AGC(Litigation)/NLO has primary responsibility for environmental litigation, except to the extent that AGC(Litigation)/NLO has delegated authority for most environmental administrative matters within the jurisdiction of local, state, or federal boards or agencies to other Offices/Commands. The AGC(Litigation)/NLO is the DON lead for defending third-party site CERCLA and state law claims and for pursuing claims against PRPs that have polluted or threaten to pollute DON property where the matter in controversy is \$50,000 or more. The Command Counsel/AGC is responsible for providing legal advice to the activity and is primarily involved in affirmative ER claims where the matter in controversy is less than \$50,000. Nevertheless, to maintain consistency in the DON's approach to affirmative cost recovery and enforcement, such offices should consult with the AGC(Litigation)/NLO.

#### **2.4.5 Judge Advocate General**

The Judge Advocate General (JAG) is the senior uniformed military lawyer in DON. The duties of the JAG are set forth in Paragraph 0331 of the U.S. Navy Regulations and in [SECNAVINST 5430.27D](#). Although environmental law is a matter under the cognizance of the General Counsel, the JAG and the members of the JAG Corps provide significant environmental legal advice and counsel. The Office of Legislative Affairs monitors the Congressional legislative process and advises DON on pending legislation. Individual judge advocates are assigned as environmental counsel to CNO N45 and the Regional Environmental Coordinators (RECs). Judge advocates also advise installation COs and their staff members on all legal matters, including environmental issues.

#### **2.4.6 Counsel for the Commandant of the Marine Corps**

Counsel for the CMC is the principal legal advisor to the Commandant on environmental matters. The Office of Counsel consists of both Marine Corps judge advocates and civilian OGC attorneys. In addition to the Counsel for the CMC and his staff, there are four regional offices in the continental United States and one overseas. These offices are similarly staffed and provide advice and counsel on environmental matters to Marine Corps commands and installations within their respective geographic areas.

#### **2.4.7 Naval Ordnance Safety and Security Activity**

NOSSA provides general supervision of explosives safety throughout DON, and technical oversight, review, and verification of the explosives safety aspects of MRP response actions. Explosives Safety Review, Oversight, and Verification of Response Actions Involving Military Munitions (OPNAV Instruction [OPNAVINST] 8020.15A) describes these responsibilities in further detail. NOSSA reviews and provides endorsement to DoD Explosives Safety Board (DDESB) on all Explosives Safety Submissions (ESSs) and



After Action Reports (AARs). NOSSA also conducts periodic on-site audits of NAVFAC MRP contractors to determine the extent to which they are complying with applicable explosives safety, environmental, and occupational health and safety requirements. They serve as a member of the Munitions Response Site Prioritization Protocol (MRSP) Quality Assurance (QA) Review Panel for DON sites.

NOSSA maintains a repository of munitions emergency response and response action notifications, ESSs and associated AARs, and other MRP project-related documents, as appropriate. The NOSSA repository is not a substitute for other required documentation repositories (e.g., the AR) maintained by cognizant commands and/or activities.

#### **2.4.8 Marine Corps Systems Command**

Marine Corps Systems Command (MARCORSYSCOM) serves as the CMC principal agent for acquisition and sustainment of systems and equipment used by the Operating Forces to accomplish their warfighting mission. MARCORSYSCOM acts as program manager for ammunition, acts as the executive agent for the Marine Corps explosives safety program, and provides necessary Marine Corps expertise for the MRP in accordance with MCO 8020.13A and MCO P8020.10.

MARCORSYSCOM maintains an archive of munitions response site (MRS)- and ESS-related documents; reviews and approves AARs, and reviews and endorses all ESSs for Marine Corps installations prior to forwarding to DDESB for review and approval; and provides oversight and verifies completion of MRP response actions.

MARCORSYSCOM may also conduct periodic on-site audits of NAVFAC MRP contractors to determine the extent to which they are complying with applicable explosives safety, environmental, and occupational health and safety requirements. They serve as a member of the MRSP QA Review Panel for Marine Corps sites.

#### **2.4.9 NSWC Indian Head Explosive Ordnance Disposal Technology Division**

This division provides technology and logistics management for the Joint Services Explosive Ordnance Disposal (EOD) programs and develops elements of intelligence, equipment, and procedures to counter munitions. It also supports DON by providing independent third-party QA for MRP projects to ensure contractor performance while conducting fieldwork, and to verify compliance with contract specifications. For further information on NSWC IHEODTD, contact the MRP coordinator at the local FEC.

#### **2.4.10 Department of Defense Explosive Ordnance Disposal Units**

In accordance with OPNAV 8027.1H, the primary mission of DOD EOD units are to provide direct combat support to joint forces, enable access to areas denied by explosive ordnance, and to facilitate operational mobility and battle space maneuvers. In addition, EOD units also provide initial support to unforeseen discovery of MEC which may include identification and Level 1 or 2 emergency response actions. Chapter 12 provides additional details on EOD unit interactions with regards to MR sites.

#### **2.4.11 NAVSEA 04N/NAVSEADET Radiological Affairs Support Office**

NAVSEA 04N/NAVSEADET RASO establishes DON policy, requirements, procedures, and regulations for the safe conduct of operations involving ionizing radiation associated with industrial operations, nuclear weapons, combat support, research, environmental cleanup, and waste management activities. They also provide oversight of these operations through a formal inspection program.

A major portion of NAVSEA 04N/NAVSEADET RASO's business revolves around management and oversight of radioactive materials used either in industrial/research applications or part of an environmental cleanup project. This responsibility directly supports the Naval Radiation Safety Committee (NRSC), which

has been issued a Master Materials License (MML) by the Nuclear Regulatory Commission (NRC) for all licensable radioactive material used, stored, and transported by the DON. Through the MML, the NRC authorizes the NRSC a number of self-regulatory responsibilities such as licensing, investigation, and inspection functions. As a condition of the MML, the DON must comply at a minimum with NRC regulations and guidance. The NRC retains overall regulatory responsibility and performs biennial inspections of the MML. The NRSC is chaired by the Director, Energy and Environmental Readiness Division, CNO N45.

The Radiological Affairs Support Program (RASP) is NAVSEA 04N/NAVSEADET RASO's vehicle for implementing the MML for DON industrial, research, operational, environmental, and waste activities. The RASP also establishes the radiation safety requirements for operations involving machines that emit ionizing radiation for these same applications. Further information on the ER Radiological Program and roles and responsibilities can be found in Chapter 13.

#### **2.4.12 Bureau of Medicine and Surgery/Navy and Marine Corps Public Health Center**

In accordance with [OPNAV M-5090.1](#) (Chapters 1-4.12 and 42-4.4), the Chief of Bureau of Medicine and Surgery (BUMED) is responsible for providing health-related support to the DON ERP. In accordance with BUMED Instruction 5450.157, BUMED has delegated these responsibilities to the NMCPHC.

NMCPHC support to NAVFAC includes coordinating with the Agency for Toxic Substances and Disease Registry (ATSDR) concerning ATSDR's legally-mandated completion of Public Health Assessments (PHAs), DON petition sites, toxicological profiles on specific contaminants, health education, health consultations, and other activities provided in the DON/ATSDR Annual Plan of Work. NMCPHC is centrally-funded to provide the following direct and indirect support to RPMs and NAVFAC ER Managers:

- PHA support on sites where ATSDR is involved;
- Human health risk assessment (HHRA) support;
- Toxicological support on chemicals that do not have an existing toxicity value, as well as on ECs and unregulated chemicals;
- Health and safety support and intervention for human receptors exposed to site contaminants before the remedy is implemented;
- Health and environmental risk assessment and communication support; and
- Community involvement support (see Section 16.8).

#### **2.4.13 Regional Environmental Coordinator**

The DON's RECs are responsible for coordinating environmental issues within their designated EPA regions. RECs are senior DON officers in a local region responsible for coordinating environmental matters and public affairs. The REC also monitors state environmental legislation and regulations for impacts on DON operations. The REC usually does not have direct involvement with RPMs or with the DON ERP, but in some circumstances may coordinate with installations and the RPM regarding ER activities.

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## Chapter 3

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### Stakeholders and Legal Agreements

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Partnerships and legal agreements with regulatory stakeholders are key for implementing the DON ERP. Legal agreements governing site management are negotiated between DON, EPA and states. These agreements influence site priorities and delineate the responsibilities of all parties. RPMs must coordinate with command counsel on all legal agreements.

#### **3.1 Stakeholders**

DON ERP includes the substantive involvement of EPA, federal land managers, other appropriate federal agencies, and state, interstate, Indian tribal, and local governments throughout the ER process. These organizations are collectively referred to as stakeholders. DON ERP provides stakeholders with notice of discrete phases of a response, adequate opportunity for timely review and comment, and takes proactive steps to identify and address issues of concern to stakeholders. These efforts have the overall goal of ensuring that decisions regarding environmental restoration activities reflect consideration of a broad spectrum of stakeholder input.

##### **3.1.1 Environmental Protection Agency**

In its role as a stakeholder, EPA provides its own project managers to ensure statutory compliance with federal environmental laws governing hazardous waste cleanups, and to assist DoD in their environmental efforts. EPA and DoD seek to operate under the partnering concept. This concept facilitates open communication and information sharing among stakeholders. Partnering enhances and expedites the remedial activities required to reach a final cleanup and provides an avenue for technology information sharing.

Although DoD is the lead agency at DoD installations, EPA plays a key role in providing oversight and input to the remedial decision-making process at NPL installations. EPA is the lead regulator for NPL installations and a BCT member for BRAC installations. EPA is a signatory for FFAs and RODs for NPL installations. Ultimately, if DoD and EPA cannot agree on the remedy for an NPL site and dispute resolution fails, EPA has the right to select the remedy. Therefore, it is important for DoD to work together with EPA throughout the ER process.

##### **3.1.2 State Regulatory Agencies**

State regulatory agencies have a mission to protect and enhance the environment of their state. Their role as stakeholders may include signing FFAs, RODs, and DDs. While the DON retains lead federal agency status under CERCLA and the NCP at non-NPL sites, the focus is normally to work with the state lead regulatory agency rather than EPA. State regulatory agencies also serve as members of the BCT at BRAC installations.

States also have a role in defining ARARs for both NPL and non-NPL sites. CERCLA §121(d) requires that, with some exceptions, federal facility RAs shall comply with the state ARARs (42 USC §9621[d]). States play a larger role at non-NPL sites. States must identify ARARs in a timely manner or their ARARs may be foreclosed from consideration by the DON in making RA decisions. CERCLA specifies that state laws “concerning removal and remedial actions, including state laws regarding enforcement, shall apply to removal and remedial actions at facilities owned or operated by [the federal government] when such facilities are not included on the NPL” (42 USC §9620[a][4]). This has been interpreted by DoD/DON to

constitute a narrow waiver of sovereign immunity. States may disagree and OGC counsel should be consulted for advice. For petroleum sites, state regulation may apply to cleanup.

It is critical that RPMs understand the statutory requirements as specified in CERCLA and RCRA regarding state regulatory agency involvement in federal facility RAs. In particular, CERCLA §120(i) created a deliberate overlap between CERCLA and RCRA CA authorities, which can blur the jurisdictional lines between the DON's CERCLA lead agency authority and the State's permitting authority, which includes CA. State regulatory agencies may participate at varying levels including information review, project consultation, and remedial decision making. It is generally beneficial to have open and honest communications with regulatory agencies regarding federal facility cleanup activities. If there is any doubt about the required level of participation, RPMs are advised to consult the ER Manager.

### **3.1.3 Agency for Toxic Substances and Disease Registry**

CERCLA established the ATSDR (42 USC §9604(i) and 10 USC §2704) to conduct PHA activities at all sites on or proposed for the NPL. ATSDR also performs health assessments for non-NPL facilities where individuals have been exposed to a hazardous substance for which the probable cause for that exposure was a release (42 USC §9604(i)(6)(A) and §9604(i)(6)(B)).

A PHA assists in determining whether action to reduce human exposure to hazardous substances at a site should be taken and if additional information on human exposure and associated risks is needed. The two primary objectives of a PHA are to:

1. Evaluate whether people in the community are contacting, have contacted in the past, or will contact in the future, hazardous chemicals that have been released into the environment; and
2. Determine whether human contact with the chemicals might result in illness or other harmful health effects.

ATSDR prepares different types of written reports to document PHA activities, results of evaluations, recommendations, and public health action plans. The two types of reports ATSDR prepares that are applicable to DON ERP sites are:

- **Public Health Assessment:** A PHA document is written to report on the results of an evaluation of all available information about a site and the communities that may be affected by it; and
- **Health Consultation:** A health consultation is written to respond to a petition, specific question or request. The health consultation provides the results of a data evaluation that answers the specific question.

ATSDR also provides toxicological profiles for the most common hazardous substances found at DoD sites. These profiles may assist in evaluating human health impacts of contamination during the RI/FS. Toxicological profiles may be obtained from the [ATSDR](#) website.

## **3.2 Federal Facility Agreements and Federal Facility Site Remediation Agreements**

The FFA is a negotiated legal agreement governing the CERCLA administrative process, including RCRA CA, for cleanup at NPL sites, and allows DON to meet its statutory Interagency Agreement requirements.

For states with mini-Superfund laws, it may be advantageous for DON to negotiate a legal agreement with the state to define the responsibilities of each party for the cleanup of non-NPL installations, or petroleum only sites. These two-party agreements between the DON and the state are referred to as FFSRAs.

### 3.2.1 Federal Facility Agreements

The provisions of these agreements are factors in setting project execution priorities through risk management and tools for formalizing DON commitments. The NAVFAC BMS provides further guidance on FFAs.

FFAs outline the working relationship between the states, EPA, and DON, and clearly define mutual obligations and jurisdictional boundaries. The purposes of the FFA are to:

- Ensure that DON thoroughly investigates environmental impacts associated with past activities at the site and takes appropriate response action as necessary to protect public health, welfare, and the environment;
- Establish a procedural framework and schedule for developing, implementing, and monitoring appropriate response actions at the site in accordance with CERCLA, RCRA, and applicable state laws; and
- Facilitate cooperation, exchange of information, and participation of DON, EPA, and appropriate state agencies and outline the working relationship between the parties, especially in terms of review processes, timeframes, and dispute resolution.

The following procedures should be observed when negotiating FFAs:

- DON will utilize the [Fort Eustis FFA](#) or most recent model language to meet the requirements of the CERCLA Interagency Agreement;
- DON should ensure the FFA provisions are realistically attainable and structured to avoid excessive reporting, duplication of effort, and other administrative practices that reduce the efficiency of the overall response action;
- Negotiations on an agreement should in no way impede DON's responsibility to protect the public from harmful exposures. The agreement also should not halt efforts to obtain response action decisions addressing its sites;
- DON will consult fully with EPA and the states regarding continuing ER efforts while negotiating the terms of the FFA;
- NAVFAC, acting through the FECs, will negotiate the agreements on behalf of and in close coordination with the installation. The language of proposed agreements will be coordinated with the CNO/CMC and DASN(E); and
- The agreements will be signed by DASN(E). Final agreements will be forwarded to DASN(E) via the chain of command.

### 3.2.2 Federal Facility State Remediation Agreements

The purpose of FFSRAs and procedures for negotiating them are similar to those described above for FFAs. In accordance with the DON [Environmental Policy Memorandum 03-01: Delegation of Authority to Sign State Cleanup Agreements](#), FFSRAs are signed by CNO N45. The NAVFAC BMS provides further guidance.

### 3.2.3 Site Management Plan

The SMP is a scheduling tool associated with FFAs and other negotiated legal agreements. The RPM also may develop an SMP for an installation that does not have a negotiated legal agreement. The NAVFAC BMS provides further details. The SMP usually contains the following:

- Introduction (description of the facility, environmental history of the facility, and purpose of the SMP);
- Scope of Work (discussion of work completed and ongoing, planned DON ERP activities at each site or operable unit [OU]);
- Site management schedules;
- Removal/interim actions;
- CTC; and
- Estimated cost for the current FY plus one.

SMPs include rolling milestones, which recognize cleanup-funding controls established by DON. Rolling milestones link specific cleanup actions to the availability of funds in a given budget year (see CNO [Environmental Restoration](#) [5090 Ser N453/5U597821]). During each update of the SMP, “Near Term Milestones” may be established for two years beyond the current FY. Under an FFA or other negotiated legal agreement, Near Term Milestones identified for the current FY are subject to stipulated penalties. These should be included only to the extent that they are executable within budget. “Out Year Milestones” should be established beginning three years beyond the current FY and extending for the life of the project, and must be consistent with adjustments made due to FY controls. For example, an SMP updated by 30 May 2018 would include a review of the FY18 Near Term Milestones and would be adjusted in accordance with any Congressional action. It also would review and establish Near Term Milestones for the following two FYs (i.e., FY19 and FY20). The Near Term Milestones for FY19 would reflect the DON FY19 budget request submitted to Congress by the President in January 2018. The Near Term Milestones for FY20 would reflect the current DON fiscal controls. The FY19 Near Term Milestones would become enforceable after the FY19 Congressional appropriation and would be adjusted to reflect any Congressional reductions or program directions.

The process repeats each spring in preparation of the new budget. The 30 May 2019 updated SMP would review the FY19 Near Term Milestones and the FY20 Near Term Milestones, and would adjust these milestones depending on the outcome of the FY20 budget process and FY19 Congressional appropriation. At the same time, the Out Year Milestones for FY21 would be rolled forward and become Near Term Milestones.

### **3.2.4 Defense and State Memorandum of Agreement**

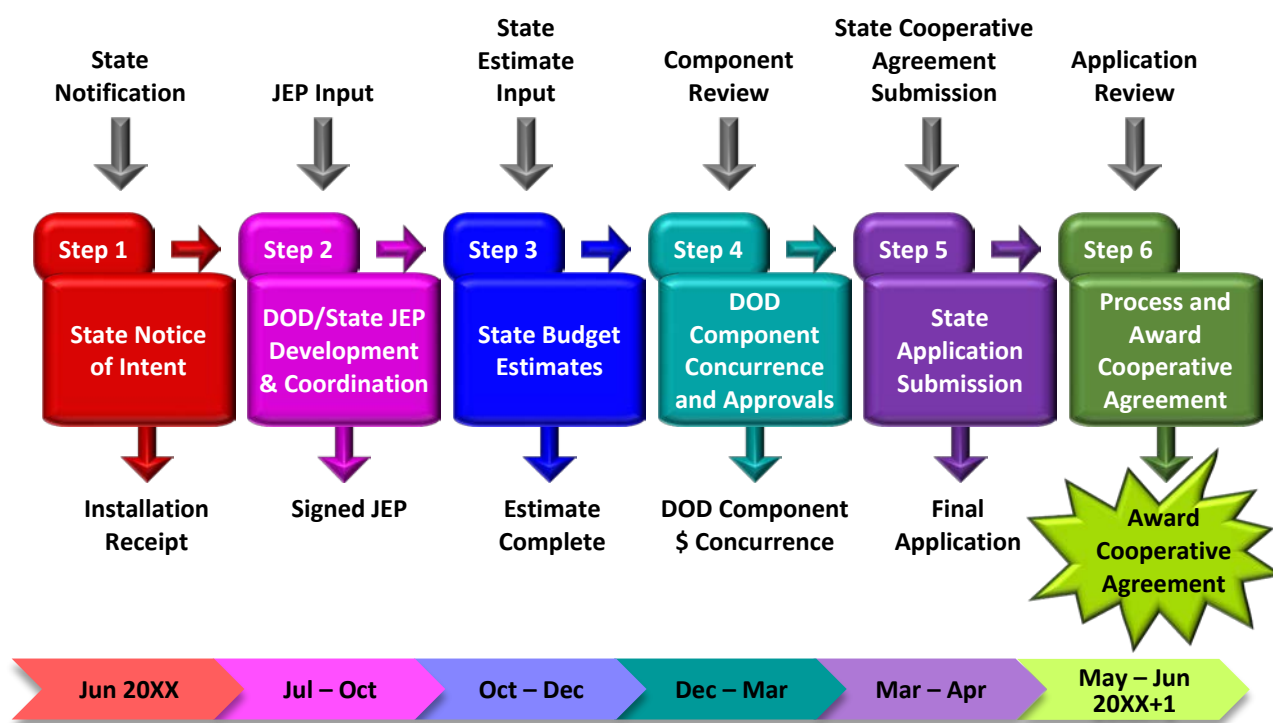
CERCLA §211(d) allows SECDEF to enter into agreements with states, on a reimbursable basis, to support the cleanup effort at DON ERP sites. DoD developed the Defense and State Memorandum of Agreement (DSMOA) Program to enhance the involvement of states and territories in the cleanup of DoD installations, and to facilitate and clarify the role of states in the DON ERP. The primary purpose of DSMOA is to specify the conditions under which DoD will reimburse a state for the cost of providing services in direct support of ER,N-funded or BRAC-funded activities. The NAVFAC BMS provides further guidance. In-depth DSMOA information can be obtained by registered users from the DSMOA Portal. The DSMOA Portal provides regulations and guidance documents as well as training in the form of “how to” videos.

Note that DSMOA is a Cooperative Agreement controlled under the DoD Grants and Agreements Regulations (32 CFR 22) and must conform to those regulations. Conformance guidance is provided in the NAVFAC BMS.

A signed DSMOA represents a commitment between DoD and the state to cooperate in expediting the cleanup program for specified installations and establishes the procedural framework for payment. A signed DSMOA, although a prerequisite for reimbursement, is not a funding instrument. Prior to a state

or territory receiving DSMOA funding, the state must first enter into a Cooperative Agreement using the six-step process described in Figure 3-1. The Cooperative Agreement includes a specific two-year Joint Execution Plan (JEP), developed during Step 2, concerning the restoration activities in the designated state or territory, as well as a plan of projects and activities for the next four years, and a process for payment.

Under Step 6, NAVFAC HQ reviews all final state Cooperative Agreement applications provided to them by the United States Army Corps of Engineers (USACE). This review ensures consistency with the cost estimates and JEP reviews that were concurred with by FECs during Step 4 for state technical services (see [Navy Implementing Guidance for DSMOA/Cooperative Agreement Program Change Order Process and the DON Cost Recovery Process](#) [Ser 9900019/ENC-WS]).



**Figure 3-1 DSMOA Six-Step Process Timeline**

These state services qualify for reimbursement:

- Technical review, comments, and recommendations on all documents or data submitted to the state for projects using ER,N or BRAC funding, including actions accomplished under the FFA or Interagency Agreement;
- DSMOA preparation/administration/amendments;
- Identification/review/determination/regulation of ARARs;
- Site visits to review DoD response actions;
- Site visits to obtain and analyze split samples;
- Support and assistance in conducting public participation requirements;
- Participation in the RAB;
- Preparation and administration of a Cooperative Agreement to implement the DSMOA;



- Independent quality assurance/quality control (QA/QC); and
- Any additional services that may be set forth in the DSMOA on a state-by-state basis.

Further details are provided in DSMOA Policy for Eligibility of State Services. Additional guidance is provided in [Working Together to Achieve Cleanup: A Guide to the Cooperative Agreement Process](#).

### **3.2.5 Navy Cost Reimbursement, Cooperative Agreement Program**

The Navy Cost Reimbursement (NCR) Cooperative Agreement Program is a voluntary program for those states that choose not to participate in the DSMOA Program. NAVFAC HQ has lead responsibility and the FECs serve as the execution agent. Washington is currently the only state participating in this program.

The [DERP Manual](#) authorizes the DoD components to pursue alternative approaches to the DSMOA for reimbursing costs of state services where appropriate. The NAVFAC BMS provides further implementation and execution details.

Note that the NCR Cooperative Agreement Program is controlled under DoD Grant and Agreement Regulations and must conform to those regulations. Conformance guidance is provided in the NAVFAC BMS.

Figure 3-2 outlines the NCR Cooperative Agreement process. Under Step 6, NAVFAC HQ reviews all final state NCR Cooperative Agreement cost estimate applications for consistency with the cost estimates and JEP reviews that were concurred with by FECs during Step 4. NAVFAC HQ also coordinates the processing of Cooperative Agreement signatures between DON and states or territories (see [Navy Implementing Guidance for DSMOA/Cooperative Agreements Program Change Order Process and the DON Cost Recovery Process](#) [Ser 9900019/ENC-WS]).

Under the NCR Cooperative Agreement program, the RPM or BEC holds the state accountable and validates the state oversight hours by person, concurs on payment of their invoice, or challenges the state payment if appropriate until resolution is met.

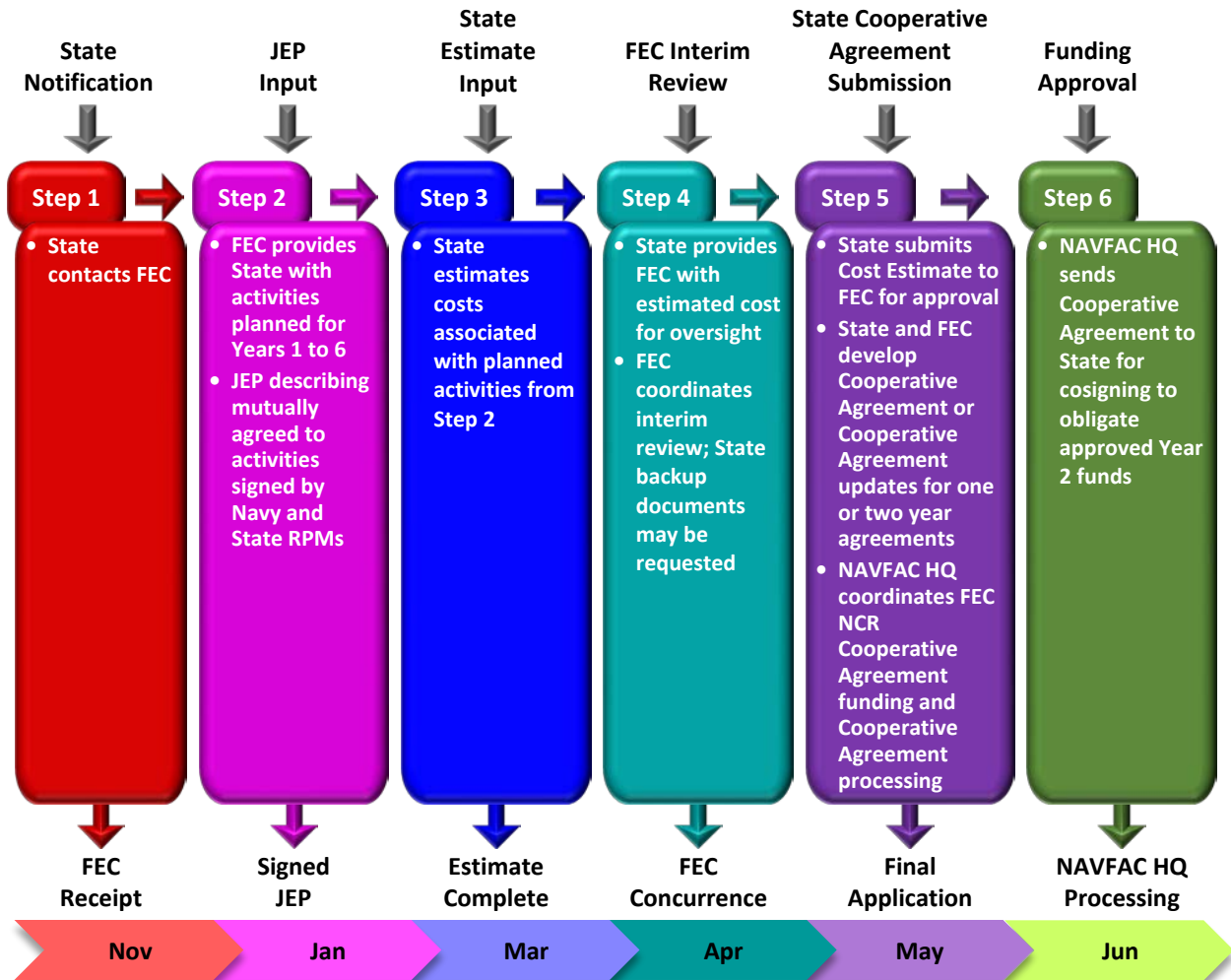


Figure 3-2 Navy Cost Reimbursement Cooperative Agreement Six-Step Process Timeline

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## Chapter 4

### Funding, Eligibility, and Prioritization

The DERP specifies criteria for determining what sites and specific work elements are eligible for ER,N and BRAC funding, and how eligible sites are prioritized to meet the DERP goals.

Each year, the DoD submits an Annual Report to Congress on its Defense Environmental Programs. The Annual Report to Congress describes the DoD's accomplishments during the past year in its restoration, conservation, compliance, and pollution prevention programs by addressing plans and funding needs for protecting human health, sustaining the resources DoD holds in the public trust, meeting its environmental requirements, and supporting the military mission. DoD's established DERP goals and associated progress are included in the Annual Report to Congress. Table 4-1 reflects the DERP site goals applicable to DON.

**Table 4-1 Defense Environmental Restoration Program Goals**

Program Category	DERP Goals
Active and BRAC Installations	Achieve response complete (RC) at 90% of IRP sites, BD/DR sites, and MRSs by the end of FY 2018. Achieve RC at 95% of IRP sites, BD/DR sites, and MRSs by the end of FY 2021.

#### 4.1 Funding and Budgeting Process

The funding and budgeting process for the DON ERP is complex. Through years of experience, DON has developed procedures and tools that have greatly improved this process. The ER,N and BRAC accounts are the two sources of funding for DON ERP execution. The following subsections describe the processes and tools used for budgeting and funding from these accounts.

NAVFAC HQ and BRAC PMO produce budget guidance that provides direction on emergent requirements for budget development. Additionally, NAVFAC HQ has created a budget primer that is available to provide complimentary guidance on recurring requirements that must be met with each submit. The primer also provides the RPM detailed instructions on the basic requirements for the budget process. Compliance with both documents is needed to meet submittal requirements. Therefore, RPMs must be fully aware of the content of both documents prior to preparing a budget submission. The primer can be found on the secure side of the NAVFAC Portal.

##### 4.1.1 Environmental Restoration, Navy Funding

The DON ER account is referred to as ER,N. Congress funds each service's ERP based on identified needs and their priority.

ER,N funding can only be obligated for response actions under the jurisdiction of SECDEF. Thus, the implementation of the DON ERP must be consistent with DERP requirements, as documented in the [DERP Manual](#). The DERP Manual provides information regarding program goals, funding, and eligibility criteria (for component ER, BRAC, and FUDS accounts), as well as numerous other implementation considerations as they apply to all DoD components.

The ER,N account is managed by NAVFAC HQ to execute both the IRP and the MRP. Other types of funds are not authorized to be used in place of, or to supplement, ER,N funds. This does not preclude the use of other funding to clean up spills from current operations or conduct activities that are not eligible for

the DERP. It also does not preclude the use of other funding sources in limited instances if a non-environmental project is impacted at an ER site (see Section 14.1.2).

ER,N funds are distributed to the FECs based on program priorities (see Section 4.3). It is the RPM's responsibility to develop a strategic plan to properly reach SC at all ER sites at the installation in a timely and cost-efficient manner, and to accurately and comprehensively identify all program requirements for each budget submittal to obtain required funding. The RPM should work with the installation to gather all necessary information to identify these requirements. This information should include:

- Quantity and location of contamination (sources include Preliminary Assessments [PAs], Site Inspections [SIs], and Remedial Investigations [RIs]);
- Identification of highest priority area(s);
- Current or reasonably anticipated future land use;
- Identification of the requirements for cleanup, LTMgt, or closeout; and
- Time and resources needed to accomplish the work for all sites or OUs.

To secure the funding required to meet DON ERP objectives, it is critical that accurate cost estimates and schedules be developed for each site.

#### **4.1.2 Base Realignment and Closure Funding**

The DON BRAC account is a separate appropriation from ER,N. BRAC funds are appropriated for program execution by Congress and are no-year money; therefore, funds in the OSD BRAC account do not expire.

Separate funding procedures have been established for cleanup requirements at installations being closed or realigned under BRAC. BRAC funding requirements are identified on a line-item basis as part of the budget process, and eligible BRAC projects are specifically budgeted against the BRAC account. All DON ERP costs on real property that is to be disposed of as a result of BRAC are charged to the ER category under the BRAC environmental line of the BRAC account.

The DON BRAC account is managed by the BRAC PMO, which is responsible for establishing budgets, setting priorities, and negotiating cleanup agreements for ASN(EI&E) signature. The BRAC PMO uses a combination of CASU and FEC personnel, including RPMs, to execute the BRAC DON ERP and perform environmental engineering functions in support of BRAC environmental cleanup.

#### **4.1.3 Environmental Restoration, Navy Budgeting**

DON submits an annual budget to OSD. It includes funding estimates for the DON ERP. The cost estimates generated by the RPM and validated by their supervisor form the basis of the DON ERP budget. The DON ERP budget requirements and POM documents are carefully scrutinized by NAVFAC HQ, CNO N45 and the Navy Comptroller as part of the Planning, Programming, Budgeting, and Execution (PPBE) process. PPBE is the term for the DoD budget process. PPBE includes long-range planning to estimate resource requirements. The budget and POM are used by DON and DoD to analyze the Future Year Defense Plan (FYDP) and to make any adjustments before the next budget is prepared. Within this process, RPM estimates are used to identify funding needs for the FYDP based on actions required to protect human health and the environment, maintain progress on existing remedial efforts, achieve RC, and meet legal obligations, including agreements with states and EPA as well as addressing public concerns.

For the ER,N program, NAVFAC issues budget allocations to the FECs for certain FYs, and the FECs build their programs within these allocations.

NAVFAC HQ then analyzes the consolidated requirements and determines whether to adjust spending plans to stay within FYDP targets, or develop a POM funding issue. Numerous factors are considered, including DON and DoD priorities, or Congress's position on funding a given program. A POM issue will compete with hundreds of DON and DoD issues for additional funding, and therefore requires detailed and convincing justification.

NAVFAC HQ defends its budgets through responses called reclusas and through budget hearings. At the end of the review, new funding levels are established, and in September of each year, DON submits a new budget to OSD. OSD then goes through a similar review process and another round of new funding levels are established. DON submits a new budget in January of the following year, and the budget is forwarded from the President to Congress in February.

Congress holds hearings, makes adjustments, and passes the appropriate authorization and appropriation bills before the beginning of the next FY. Otherwise, Congress passes a continuing resolution that is sent to the President for his signature or veto.

The annual federal budget process timeline, including concurrent budget cycles, is illustrated in Figure 4-1. More information is provided in the NAVFAC BMS.

NAVFAC HQ requires two budget submittals from the FECs each year: one in April (mid-year) and one in October (end of year). The mid-year submittal is used to provide an update on progress to ASN and CNO, report financial liabilities, and prepare the budget submission to the Navy Comptroller. The end-of-year submittal is used to report program progress to CNO, ASN, and DoD. The submittals are also used to prepare the President's Budget to Congress, the Annual Report to Congress and the POM. Data from these submittals is shared with the public and contractor community for awareness of upcoming requirements.

POM and budget development are based on the requirement to maximize progress towards program metrics, control program cost, and address relative site risk and regulatory risk. This data is captured in the NORM database.

The project requirements and cost estimates generated in preparation of these submittals form the basis of the POM. This is the process DoD uses to establish funding requirements. If the program cannot clearly articulate a requirement, the DON cannot budget for it. The DON ERP budget requirements and documents are evaluated up the DON chain of command as part of the PPBE, which is used by DoD to analyze the FYDP and to make funding adjustments before the next budget is prepared.

For the ER,N program, after FYDP funding levels are established, NAVFAC HQ issues budget allocations to the FECs by FY. The FECs build their programs within these allocations based on guidance from NAVFAC HQ and progress towards achieving RC goals. If a FEC is unable to fund a critical project within its control, it can submit an unfunded issue to NAVFAC HQ for review; each FEC should look internally for projects that can be deferred prior to asking for assistance from NAVFAC HQ.

DON is subject to stipulated penalties for missed milestones at EPA designated CERCLA NPL sites that have signed FFAs. If dispute resolution between signatory parties is unsuccessful, monetary penalties can be assessed. Funds used to pay these penalties must be congressionally approved before payment can be made. If this situation arises, FECs need to work with NAVFAC HQ to assure proper coordination up the chain to notify Congress and get proper authorization before a payment is made.

		Budget Year		
		Current FY	Current FY +1	Current FY +2
Current Calendar Year	↑	Oct	Start Execution Using Current FY Funding	
		Nov		POM Current FY +2 Requirements Due
		Dec		
Calendar Year + 1	↓	Jan	Current FY +1 Budget to Congress	POM Current FY +2 Assessment
		Feb		
		Mar	Mid-Year Adjustment of Current FY Budget	Hearings for Current FY +1 Budget
		Apr		
		May	Hearings for Current FY +1 Budget	Program Review Current FY +2 Decisions
		Jun		
		Jul	Summer Adjustment for Current FY +1 Budget	Current FY +2 Budget Preparation
		Aug		
		Sep	End Execution Using Current FY Funding	Current FY +2 Budget to DoD

**Figure 4-1 Annual Federal Budget Process Timeline with Concurrent Budget Cycle**

The [FFCA](#) waives federal immunity from fines and penalties imposed as a result of failing to comply with federal, state, and local procedural and substantive requirements relating to RCRA. Although the FFCA relieves federal employees from personal liability or civil penalties resulting from acts or omissions within the scope of their official duties, criminal liability under any federal or state hazardous waste law is not waived. Fines and penalties assessed under the authority of the FFCA associated with DON ERP activities are considered eligible for ER,N or BRAC funding (all fines and stipulated penalties issued against any DON ERP actions must be submitted, via the chain of command, by ASN to Congress for approval).

#### **4.1.4 Base Realignment and Closure Budgeting**

The budget preparation and submittal process for BRAC environmental cleanup is similar to that described in Section 4.1.3. The BRAC PMO works closely with its Resource Sponsor, CNO N45, to develop and defend the BRAC budgets. The BRAC PMO also supports ASN(EI&E) budget testimonies to Congressional leaders. After funding has been authorized and appropriated by law and allocated from the DoD BRAC account(s), the BRAC PMO manages the funds for BRAC environmental cleanup.

#### **4.1.5 Cost Estimating for Environmental Restoration Program Budget**

Cost estimates for ER projects shall be based on reliable source information because they are developed to establish funding requirements through the PPBE process. To facilitate the development of accurate cost estimates in a consistent manner, these estimates are documented using the DON ERP programmatic budgeting tool for cost reporting and projecting called NORM. Response actions for every site eligible for ER,N or BRAC environmental funds shall be budgeted for and updated within NORM. Further details about NORM are provided in Section 15.7.1.1.

RPMs use NORM to provide semi-annual CTC estimate updates (at the middle and end of each FY) for ER sites, and annual CTC estimate updates for BRAC. These updates are consolidated, reviewed, and validated at NAVFAC HQ, and are used to fulfill all financial reporting requirements. NAVFAC HQ provides specific budget guidance to RPMs prior to each submittal. During these submittals, CTC updates must include:

- Costs adjusted for annual inflation;
- Removal of current-year execution from the CTC estimate;
- Updating the CTC based on any changed requirements; and
- Adequate CTC documentation and an audit trail for CTC estimates.

CTC estimates are developed outside the CTC system (for example, Microsoft® Excel spreadsheets) then incorporated into NORM as user defined costs.

It is NAVFAC policy to use the best available estimate at the time of preparation. When little information is available for a project or at a site, it may be appropriate to use parametric cost models. Remedial Action Cost Engineering and Requirements (RACER) software provides consistent CTC estimates based on standardized cost models that are updated and validated annually, and it is the approved software to use in this program. Estimates prepared using RACER must include documentation of assumptions in the comment fields of the RACER software. The software is available to DON RPMs, and training workshops for RACER are conducted to ensure compliance with DoD guidance and reporting requirements.

When more information becomes available for a site or if a site can clearly be delineated, a detailed engineering estimate is the preferred option. Documents such as Feasibility Studies (FSs), Engineering Evaluation/Cost Analyses (EE/CAs), or other detailed government estimates will meet this requirement. It is necessary to include these estimates in NORM. Given the maturity of the program and the availability of historical information on DON sites, the use of these detailed cost estimates is highly encouraged.

Whether an RPM uses RACER or develops a more site-specific detailed cost estimate, the user defined cost models (UDCMs) must provide sufficient breakdown cost detail to justify the project costs proposed. UDCMs will need to provide enough documentation to support the proposed costs and allow a third party auditor to track and confirm that the costs are verifiable within the model and justified with a sufficient level of detailed breakdown.



The CTC estimates should include only those costs associated with tasks that are eligible for ER,N or BRAC funding and reflect the current ER strategy that the RPM intends for the site. Through the site characterization process, the RPM is able to improve the basis of the cost estimate as more information becomes available and project site requirements are continually refined. CTC estimates represent the most reasonable and probable estimate given the level of information available at the time; therefore, estimating for a worst case scenario or using a very optimistic approach is discouraged. UDCMs must be supported by defensible backup data/information. This generally requires more than a single line of costing. The basis for UDCMs must be appended to the estimate in NORM to meet audit readiness.

CTC estimates include all anticipated costs required to perform site restoration, including the costs of complying with applicable legal and regulatory requirements, and are calculated by totaling the cost estimates for all remaining phases of a cleanup program. CTC factors to consider include:

- The current or reasonably anticipated land use of the site based on currently available information, including the cost of completing all remaining studies, removal activities, or RAs (including O&M of remedial systems);
- If the actual duration of the LTMgt phase (long-term monitoring [LTM], five-year reviews, and LUCs) cannot be estimated, or it is anticipated that this phase will continue indefinitely, then costs should be estimated for 30 years;
- Estimates are reported as specific amounts (i.e., point estimates);
- Estimates are maintained in a current-year cost basis and reflect annual inflation escalation/de-escalation; and
- Estimates are not based on the availability of funds, but rather reflect unconstrained actual requirements.

#### **4.1.6 Environmental Liabilities Reporting**

In compliance with the 1990 Chief Financial Officers Act, and subsequent legislation, the DON ERP shall improve financial management and reporting, and provide accurate, complete, reliable, timely, and auditable financial information. DON ERP financial reporting is based on CTC estimates developed by the RPMs. CTC estimates must be retrievable and defensible to comply with existing legislation and to provide assurance to the public that an accurate picture is being presented in financial statements.

The Office of the Assistant Secretary of the Navy, Financial Management and Comptroller (OASN(FM&C)) provides the annual financial report for the DON and detailed justification materials. DON ERP must produce timely, accurate, and auditable financial information to OASN(FM&C). Audits of DON ERP will continue periodically and require that CTC estimates and supporting documentation be complete, accurate, properly referenced, and retrievable.

The ER,N Program Budget Submit Guidance Primer is available on the secure side of the NAVFAC Portal. This document, along with the ER,N Budget Guidance and RPM Checklist that are sent out by NAVFAC HQ before each NORM submit, provide guidance and references for audit readiness preparation and CTC documentation. In order to maintain audit readiness, CTC estimates must reflect the most current understanding of site requirements and they must be completely documented. The two critical pieces of documentation that must be maintained within NORM are the CTC Level 3 Report (L3 report) and the UDCM supporting documentation. The L3 report is a system-generated report that is the primary Estimate Summary Document. The L3 report summarizes the cost and narrative information input by RPMs into the various tabs and modules of NORM. The UDCM supporting documentation must be properly stored

in the NORM Documents tab, and associated with the cost model that is being supported using the Associate Model/Document function built into NORM.

## **4.2 Environmental Restoration Program Eligibility Criteria**

The following subsections define criteria to determine what response actions are eligible for DON ERP funding and the specific work elements eligible for funding. For specific project considerations or questions, RPMs should consult with their respective NAVFAC ER Managers.

Some sites are addressed under the DON ERP even though they do not appear to meet the criteria described in Table 4-2. As a result of changing eligibility criteria in the 1990s, a number of sites were identified by regulatory agencies, included in agreements between DON and the agencies, and response actions proceeded. These sites were “grandfathered” into the program in 1998, per direction from CNO via the DON Policy on Availability of ER,N Funding for Response Actions. This was a one-time fix to maintain good faith with the agencies regarding these sites. DON ERP funding eligibility criteria as described in this chapter shall be followed for all new sites.

### **4.2.1 Response Action Eligibility Criteria**

For response actions to be eligible for ER,N or BRAC funding, the facility or site must first meet eligibility requirements; the contamination that prompts the response action must have been caused by a release that meets eligibility requirements. Eligibility must be determined by the end of the PA phase to continue using ER,N and BRAC funding in subsequent ER phases. Ineligible releases on active installations must be funded by the installation. ER response action criteria for eligibility and ineligibility are detailed in the DERP Manual. Table 4-2 lists examples of eligible and ineligible activities. Contact NAVFAC HQ when there is uncertainty about a response action eligibility.

**Table 4-2 DON ERP Eligibility**

#### **Eligible Environmental Restoration Activities**

Eligible ER activities are those necessary response actions undertaken by DON within the United States to address DON releases of:

- A hazardous substance.
- A pollutant or contaminant that creates an imminent and substantial endangerment to the public health or to the environment.
- Petroleum, oil, or lubricants (POL) that create an imminent and substantial endangerment to the public health or to the environment.
  - CERCLA contains a petroleum exclusion, so it may not be used to address certain releases of POLs. POL releases may be covered under other applicable authorities consistent with DERP, such as RCRA.
- A hazardous waste or hazardous waste constituent.
- UXO, DMM, and MC at defense sites that create an imminent and substantial endangerment to the public health or to the environment. Defense sites do not include operational ranges, operating storage or manufacturing facilities, or facilities that are used for or were permitted for the treatment or disposal of military munitions.
  - If an MRS is eligible for ER,N or BRAC funding and encompasses water, the DON’s site-specific evaluation of explosive hazards and human health risk for the recreational diver scenario should consider munitions at depths greater than 120 feet (the maximum depth to

**Table 4-2. DERP Eligibility Criteria (Continued)**

<p>which most recreational divers may descend) to have a physical constraint equivalent to a barrier that prevents direct access and to be beyond potential human exposure.</p> <p>Eligible ER activities are those that take place at facilities or sites where DON is or was the “owner or operator” under CERCLA, which may include:</p> <ul style="list-style-type: none"> <li>• A facility or site owned by, leased to, or otherwise possessed by the United States and under the jurisdiction of the SECDEF.</li> <li>• A facility or site that was under the jurisdiction of the SECDEF and owned by, leased to, or otherwise possessed by the United States at the time of actions leading to contamination.</li> <li>• A facility or site that is not on real property that is or was owned by, leased to, or otherwise possessed by the United States and under the jurisdiction of the SECDEF, provided that contamination attributable to the DoD has migrated from (e.g., by groundwater flow), or military munitions have come from (e.g., munitions landing off an operational range that were not promptly retrieved) an eligible facility or site.</li> </ul>
<p><b><u>Removal of Unsafe Buildings</u></b></p> <ul style="list-style-type: none"> <li>• ER,N and BRAC account funding may be used for the demolition and removal of unsafe buildings and structures only with written authorization from the ASD(EI&amp;E).</li> </ul>
<p><b><u>Other Eligible Payments</u></b></p> <p>Other payments that are eligible for ER,N and BRAC account funding include these payments when they directly assists DON in carrying out its cleanup program:</p> <ul style="list-style-type: none"> <li>• ATSDR pursuant to 10 USC §2704 is required to complete a public health assessment within one year of EPA proposing a facility for the NPL. Health research activities unrelated to cleanup decisions are not eligible for ER,N and BRAC account funding.</li> <li>• Service of other entities (e.g., DSMOA Cooperative Agreements described in Section 3.2.4) pursuant to 10 USC §2701(d).</li> <li>• Technical review committees (TRCs), RABs, and Technical Assistance for Public Participation (TAPP) grants pursuant to 10 USC §2705.</li> </ul>
<p><b><u>Petition for Eligibility</u></b></p> <ul style="list-style-type: none"> <li>• In exceptional cases, the DON may petition the Deputy Assistant Secretary of Defense for Environment, Safety and Occupational Health for clarification or approval to consider a specific activity as an eligible ER activity.</li> </ul>
<p><b><u>Management, Support, and Related Costs</u></b></p> <ul style="list-style-type: none"> <li>• In addition to payments attributable to ER activities, the ER,N and BRAC accounts are available to pay the ordinary and necessary costs of DON administration for the ERP. This includes the cost of preparing and presenting DON claims at third party sites, and the costs of evaluating and defending claims against the DON related to the ERP, and sites at which DoD or DON liability is alleged.</li> </ul>
<p><b><u>Ineligible Activities</u></b></p> <p>These activities are not DON ERP actions and are ineligible for DON ERP funding:</p> <ul style="list-style-type: none"> <li>• The closure (along with required closure plans and post-closure requirements) of TSD units regulated by a RCRA permit or operating under interim status.</li> </ul>

**Table 4-2. DERP Eligibility Criteria (Continued)**

<ul style="list-style-type: none"><li>- Such closure differs from RCRA corrective actions. Closure of a TSD unit is a planned part of the lifecycle of the waste management unit, whereas corrective action responds to past releases of solid or hazardous waste at a permitted or interim-status facility.</li><li>• Any routine operation, management, or maintenance at an operating DON facility or site that is not part of an ER activity, including routine operational range maintenance and sustainment activities.</li><li>• Activities to terminate a Nuclear Regulatory Commission license pursuant to 42 USC §§2011-2297.</li><li>• An immediate, short-term response required to address a spill or release (e.g., DoD aircraft crash). A response to a spill or release will be immediate (e.g., as soon as the spill or release occurs, is discovered, or should have been discovered). The immediate, short-term response is not time-limited when slow or no actions are taken to respond to a spill or release. An immediate, short-term response should include debris and soil removal and end before long-term cleanup characterization.</li><li>• Explosives or munitions emergency responses.</li><li>• Responses at contractor-owned and –operated facilities, unless the facility was owned by, leased to, or otherwise possessed by the United States at the time of the actions leading to contamination, or contamination attributable to the DON has migrated from or military munitions have come from a DON ERP eligible site.</li><li>• Removal of aboveground storage tanks (ASTs) and associated piping or USTs and associated piping for tanks at an installation, other than a BRAC location or FUDS property.</li><li>• Responses to address releases that are solely the result of an act of war. When the DON is considering using the act of war ineligibility provision pursuant to CERCLA §9607(b)(2) the DON shall elevate the issue to the ASD(EI&amp;E) for approval before proceeding with the exclusion.</li><li>• Releases at facilities where DoD was not the CERCLA “owner or operator” at the time of the release (e.g., Reserve Officers’ Training Corps facilities owned and operated by a State University).</li><li>• Responses at locations outside the United States.</li><li>• Responses at Defense Plant Corporation and similar properties for which successor agencies and departments other than the DoD are responsible for ER activities.</li><li>• Responses to UXO, DMM, or MC on operational ranges, operating storage or manufacturing facilities, or facilities that are used for or were permitted for the treatment or disposal of military munitions.</li><li>• Responses, including surveys, containment, removal, or disposal, to asbestos and lead-based paint that have not been released to the environment.</li><li>• Activities that duplicate a response that was completed under another ER authority (e.g., a CERCLA response when a release was already investigated and addressed under a state authority) unless the response has failed to achieve its ER objectives. This does not prohibit returning to complete the necessary actions.</li><li>• Activities that are subject to a legal agreement or property transfer document (e.g., deed or environmental services CA) between the DoD (or the United States) and another party that</li></ul>
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**Table 4-2. DERP Eligibility Criteria (Continued)**

<p>assigns ER responsibility to a party other than the DoD. The DON should evaluate the document to determine if it is effective and enforceable, and if the other party is viable and therefore able to perform the necessary work under the circumstances at the site. If the DON determines, based on the evaluation, that the document is not effective and enforceable or the other party is unable to perform, then the activities may be eligible if they otherwise meet the requirements of this manual.</p> <ul style="list-style-type: none"><li>• Responses at facilities for which there are no records or evidence that DoD was the CERCLA owner or operator. Documentation of physical evidence (e.g., site visit documenting military munition use) can be a record.</li><li>• Activities funded by a specific appropriation.</li><li>• Responses to address releases due to a successor owner's or operator's actions, omissions, or lack of maintenance that allowed the release to occur.</li><li>• Responses to naturally occurring substances.</li><li>• Payments to settle response cost claims. This includes payments for response costs already incurred, and payment prior to a final services agreement under 10 USC §2701(d).</li></ul>
<p><b><u>Ineligible Payments</u></b></p> <p>Payments that are ineligible for ER,N or BRAC account funding include:</p> <ul style="list-style-type: none"><li>• Payments of EPA administrative or oversight costs, unless expressly authorized by an act of Congress and funds are appropriated for this purpose.</li><li>• Any payment pursuant to a court judgment or compromise settlement.</li><li>• Fines or penalties without congressional authorization pursuant to 10 USC §2703(f). The DON coordinates legislative proposals with the ASD(EI&amp;E) and Deputy General Counsel for Environment and Installations (DGC[E&amp;I]).</li></ul>
<p><b><u>Use of the Judgment Fund</u></b></p> <ul style="list-style-type: none"><li>• When the requirements of the Judgment Fund established in 31 USC §1304 are satisfied, the Judgment Fund is available to pay court judgment, awards, and compromise settlements certified for payment by the Financial Management Service, Department of the Treasury, at the request of the Department of Justice, arising from a DON liability under environmental law. The DON legal offices shall consult with DGC(E&amp;I) on questions regarding whether ER,N, BRAC account, or the Judgment Fund is available for use.</li></ul>
<p><b><u>DERP at Joint Bases</u></b></p> <ul style="list-style-type: none"><li>• In general, the January 22, 2008 Deputy Secretary of Defense Memorandum and April 15, 2008 Deputy Under Secretary of Defense for Installations and Environment Memorandum shall govern DON implementation of joint basing.</li><li>• The supporting and supported DoD Components shall develop a memorandum of agreement for the joint base that clearly specifies the date of transfer on which the supporting DoD Component shall assume ERP responsibilities (e.g., data reporting, budgeting, record keeping, financial liability, and ER contracts), negotiated agreements (e.g., inter-Service, DSMOA CAs, FFAs) and orders in effect, and total obligation authority funding from the supported DoD Component.</li><li>• This does not apply to traditional host-tenant relationships.</li></ul>
<p><b><u>Host Environmental Restoration Requirements</u></b></p>

**Table 4-2. DERP Eligibility Criteria (Continued)**

<ul style="list-style-type: none"><li>• In general, the installation is responsible for all DoD tenant ER requirements that are eligible for ER funding through the ER,N or BRAC account.</li><li>• This does not preclude the DON from making separate agreements for specific situations where there is another funding authority.</li></ul>
<p><b><u>Potential Sites with Munitions of Unknown Origin</u></b></p> <p>For munitions that appear to be military munitions, which at discovery cannot be attributed to a specific DoD Component, and are encountered on property that is not currently and may never have been owned or operated by DoD:</p> <ul style="list-style-type: none"><li>• The DoD Component that first becomes aware of such a situation will immediately inform the ASD(EI&amp;E) of the circumstances and provided ASD(EI&amp;E) available information and documents concerning the situation.</li><li>• The DON will respond to requests for information and feedback from ASD(EI&amp;E) as described in the DERP Manual, and will take action as directed by ASD(EI&amp;E).</li></ul>

#### **4.2.2 IRP versus MRP Site Eligibility**

Sites meeting the above criteria and that primarily address responses to MEC and MC are recorded as new sites under the MRP and funded under the MRP element within the ER,N account. Any incidental chemicals of concern (COCs) are incorporated as part of the response under the MRP.

For IRP sites where incidental quantities of MEC are encountered as part of the overall site cleanup, the MEC portion should be incorporated into the overall IRP response.

Response actions to address outdoor small arms ranges (less than or equal to .50 caliber) can be conducted under the IRP, although most small arms range sites are now managed under the MRP.

#### **4.2.3 Adding New Installations and Sites to the Environmental Restoration Program**

For all new sites identified by DON, documentation must show that the contamination was attributable to the installation's actions at the site in order for it to meet eligibility requirements for ER,N funding. The term "installation's action" means a function or operation that occurred at an installation.

#### **4.2.4 Determination of Site Eligibility**

Before a site can be added to the DON ERP for ER,N funding, the RPM, through authorization of FEC management, shall submit justification data using the appropriate installation and site approval forms (i.e., Installation Approval Form, Site Approval Form, and the Pick List) for approval by NAVFAC HQ. The justification of eligibility shall include proof that the installation's actions caused the contamination.

DON ERP costs on real property that is to be disposed of as a result of BRAC are eligible for BRAC funding. These costs are charged to the ER category under the BRAC environmental line of the BRAC account. As with ER,N, the BRAC RPM shall submit justification data using the appropriate site approval forms. All new site additions must be approved by the BRAC PMO.

#### **4.2.5 Eligibility of Specific Work Elements**

Various work elements are performed during execution of the DON ERP at eligible sites. Some elements are eligible for ER,N or BRAC funding and others are not. This section clarifies which of those work elements are considered eligible for ER,N or BRAC funding. The lists of eligible and non-eligible work elements are all inclusive. RPMs should consult with their managers for site-specific considerations.

The following work elements are considered eligible for ER,N or BRAC funding:

- Investigations to identify, confirm, and determine risks to human health and the environment;
- FSs or EE/CAs, Remedial Action Work Plans (RAWPs) and designs, and removal activities or RAs;
- Expenses associated with cooperative multi-party cleanup plans and activities including litigation expenses;
- RAs to protect or restore (not enhance) natural resources affected by contamination from past releases of hazardous substances, to include short-term losses;
- Cleanup of LLRW sites that have been approved as IRP sites;
- Management expenses associated with the DON ERP (overhead costs required for adequate program oversight and management, including salary and support for installations);
- O&M and optimization costs for remedial and monitoring systems;
- Immediate actions necessary to address health and safety concerns, such as providing alternate drinking water supplies or treatment of contaminated drinking water when the hazard results from an eligible release from DON property;
- Studies to locate abandoned USTs, to determine whether a release has occurred, and to clean up the DON ERP eligible contamination;
- CERCLA response actions and eligible RCRA CAs identified in FFAs or Interagency Agreements;
- Support services provided by another federal agency (such as the U.S. Fish and Wildlife Service, U.S. Geological Survey [USGS], and ATSDR) in accordance with 10 USC §2701(d), provided that the FEC has identified why the services of an outside agency are required and prepared an Economy Act Determination and Finding before formalizing inter- or intra-agency acquisitions as required by 31 USC §1535. The requester shall identify the servicing agency, contract vehicle, and service desired, attach the executed Determination and Finding to the order, and make appropriate arrangements for payment. The Determination and Finding must be endorsed and approved in accordance with NAVFAC Memorandum Procedures for Federal Interagency Acquisition;
- Support services provided by state agencies for their involvement or oversight of DON ERP projects in accordance with 10 USC §2701(d), through either DSMOA or the NCR Cooperative Agreement programs;
- Fines and penalties imposed by regulatory agencies assessed under the authority of the FFCA associated with DON ERP activities (all fines and stipulated penalties issued against any DON ERP actions must be submitted, via the chain of command, by ASN to Congress for approval);
- CAs at DON ERP eligible SWMUs required by RCRA §§3004(u) and 3008(h), 42 USC §§6924(u) and 6928(h);
- Any needed investigations of eligible areas of concern (AOCs) for relative risk site evaluations. An AOC is a discrete area of suspected contamination that has not been entered into the NORM database;
- Five-year reviews and LTMgt costs for sites that achieved RC at an installation;
- Salary and support funding at an installation for certain tasks as specified in NAVFAC's memorandum [Environmental Restoration, Navy \(ER,N\) Program Activity Salary and Support](#)

[Funding](#) (5090 Ser 009003/ENC-MD). This memorandum indicates the activity personnel ER functions that are approved in supplementing RPM responsibilities; and

- Assisting litigation efforts on cost recovery actions from government-owned/contractor-operated (GOCO) facilities and other third-party responsible parties.

The following work elements are considered ineligible for ER,N or BRAC funding:

- Expenses associated with the settlement of claims against the United States;
- ER activities in foreign countries;
- State-supported services that:
  - Were provided prior to 17 Oct 1986;
  - Are past state costs not reasonably documented;
  - Are in support of non-DON ERP-funded cleanup activities; and
  - Were provided where neither an FFA, nor a DSMOA, nor any other Cooperative Agreement relationship exists.
- Removal and/or disposal of debris and investigation and cleanup of contamination without documented evidence of hazardous substance or pollutant or contaminant release;
- Costs of testing, storing, disposing of, or replacing PCB transformers;
- Costs of spill prevention and containment measures for currently operating equipment and facilities;
- Initial response costs of spills associated with current operations;
- Construction of hazardous waste storage, transfer, treatment, or disposal facilities, except when part of a DON ERP response action;
- Testing or repair of active underground tanks and costs to replace leaking underground tanks;
- Costs of O&M, or repair to hazardous waste TSD facilities which are currently in use (i.e., regulated or permitted), except when part of a DON ERP response action;
- Costs of hazardous waste disposal operations, including associated management and operational costs, unless the costs result from implementation of a DON ERP eligible response action;
- Actions (contingency response and closure) at regulated TSD units that meet standards under 40 CFR Part 264 and have been issued a final operating permit under 40 CFR Part 270;
- Facility improvements to meet RCRA operating standards at TSD units;
- MEC/material potentially presenting an explosive hazard (MPPEH) clearance or scrap removal/disposal from operational test and training ranges;
- Remediation and/or closure of open burning/open detonation/static firing sites that are included in a RCRA hazardous waste treatment permit or permit application, or portions of prior permitted sites on which actual treatment operations have been conducted since interim status was obtained;
- Radiological release surveys for any construction or repair projects; and
- Any routine operation, management, or maintenance at an operating facility or site that is not part of an ER activity, including routine military range maintenance and sustainment activities at operational ranges.



The following work elements are considered ineligible for ER,N funding, but may be eligible for BRAC funding. BRAC RPMs and PMO personnel should check with BRAC PMO policy and management before proceeding:

- EPA oversight costs;
- Efforts to prepare real estate action documents (e.g., Environmental Condition of Property [ECP], finding of suitability to transfer [FOST], finding of suitability to lease [FOSL]);
- Costs of asbestos and lead-based paint surveys, containment, removal, or disposal limited to inside or part of an existing structure;
- Closing or capping sanitary landfills unrelated to a hazardous waste cleanup action; and
- Cleanups within buildings (e.g., PCB-contaminated floor cleanups, etc.).

### **4.3 Site Prioritization**

The DON ERP is a complex program made up of approximately 5,500 sites. DON is performing response actions at all sites, but is unable to remediate every site simultaneously. This means that careful consideration and planning are required to prioritize sites so that resources are used efficiently to maximize reduction in risk and to progress toward ER goals.

For IRP sites, DoD developed the Relative Risk Site Evaluation Model (RRSEM) to reduce risk and complete restoration requirements on a worst-first basis (i.e., sites that pose the greatest risk to human health and the environment take precedence). DON uses RRSEM to determine the risk posed by each site relative to other sites in the inventory so that funding can be allocated to achieve the greatest risk reduction. For MRP sites, DoD has a formal prioritization protocol to address specific issues related to MEC and MC, titled Final Rule for Munitions Response Site Prioritization Protocol (70 FR 192). For BRAC sites, prioritization is driven largely by property transfer needs.

#### **4.3.1 Installation Restoration Program Site Prioritization**

It is the RPM's responsibility to review data necessary to rank sites, obtain missing data, and determine site priorities. DoD developed the RRSEM to systematically prioritize sites based on each site's potential risk relative to other sites in the program. With RRSEM, DON ranks sites in risk categories (high, medium, or low) based on the nature and extent of contamination, the potential for contaminants to migrate, and the populations and ecosystems that could be impacted. The placement of sites into one of the three risk categories is not a substitute for either a baseline HHRA or a baseline ecological risk assessment (BERA), or an ATSDR PHA, nor is it a means of placing sites into a category for no further action (NFA). The RRSEM is used for risk ranking and prioritization.

The relative risk ranking considers the concentration of the contaminant, whether there is a pathway through which the contaminant can migrate, and whether there are people or ecosystems along that pathway that will be affected. The relative risk ranking is considered along with other program management factors to determine the sequencing of sites for cleanup within funding limits with worst cases first. Other management factors considered are requirements in legal agreements, military readiness, stakeholders' concerns, and availability of innovative technologies and packaging of cleanup actions for cost-effective contracting. The DON ERP goals are directly linked to the RRSEM framework and DERP goals, focusing on addressing sites in higher risk categories first.

The RRSEM provides an evaluation of site information at a point in time based on three key factors: the contaminant hazard factor (CHF), the migration pathway factor (MPF), and the receptor factor (RF). Factor ratings are based on a quantitative evaluation of contaminants, a qualitative evaluation of pathways, and

human or ecological receptors in the media most likely to result in significant exposure (groundwater, surface water, sediment, and surface soils). The framework evaluates each media using the three factors (CHF, MPF, and RF) that relate to risk assessment. Each of the three factors is given a rating based on available site information for a given media. The framework combines the CHF, MPF, and RF ratings for each media at a site using a relative risk evaluation matrix to obtain a risk designation of high, medium, or low. The framework identifies the highest media designation as the risk designation for the site. Additional information can be found in the DoD Relative Risk Site Evaluation Primer. The following definitions provide a general description of the site risk categories:

- **High Relative Risk Site:** Sites where contamination is present and conditions indicate a migration pathway is completed either to human or sensitive ecological species receptors at concentrations posing public health or environmental threats, or contamination could easily and rapidly migrate to such a receptor population;
- **Medium Relative Risk Site:** Sites where human, ecological, or sensitive species receptors are present, a migration pathway exists, and evidence indicates that transmission of a contaminant to receptors is not expected to occur at levels of public health or ecological concern within the next 5 to 10 years; and
- **Low Relative Risk Site:** Sites where contaminant presence does not currently pose a threat to human, ecological, or sensitive species receptors, and is not likely to pose a threat in the future because of low contaminant hazard, absence of a complete pathway scenario, or absence of human, ecological, or sensitive species receptors.

In the RRSEM, sites also can be designated as not evaluated. The not evaluated designation refers to sites that have not been investigated thoroughly enough to determine a relative-risk ranking.

#### **4.3.2 Munitions Response Site Prioritization Protocol**

DoD published the Final Rule for MRSP as a methodology that uses available data to prioritize sites known or suspected to contain UXO, DMM, or MC for response actions. DoD developed the MRSP through a collaborative process with the states, American Indian and Alaska Native Tribes (tribes), and federal agencies. It is not a full-scale risk assessment (as is conducted during the Remedial Investigation/Feasibility Study (RI/FS) or EE/CA phases of a CERCLA response) and does not require environmental sampling or geophysical surveys to be effective. The protocol is used for assigning a relative priority to each MRS for response activities related to MEC based on the overall conditions at the site.

In accordance with DoD and CNO policy, DON has established an MRSP QA panel, consisting of CNO N45, NAVFAC HQ, NOSSA, CMC and MARCORSYSCOM representatives, as appropriate, to review prioritization decisions. The QA panel ensures consistency in data collection and application of MRSP, and ensures that the priority accurately reflects site conditions. If the QA panel concludes that the MRSP has not been applied to an MRS correctly or consistently, the QA panel may recommend a change that results in a different priority. The panel's decision, when adopted, will supersede the original priority assigned.

##### **4.3.2.1 MRSP Quality Assurance Panel Business Rules**

To facilitate consistency in DON MRSP scoring, the QA Panel developed a set of business rules for use by the RPMs during the development of site-specific scores and the QA Panel during reviews. Since the MRSP Module in NORM is used to maintain and update MRSP scores for individual MRSs, these business rules were developed to be used in conjunction with NORM. The business rules, which are periodically

updated, are maintained by the NOSSA and MARCORSYSCOM QA Panel members and contain general and table-specific guidance. Some of the basic rules are provided here:

- The NORM MRSPP Module must be updated any time there is new information (e.g., sample results, discovery of new munitions, or something that significantly changes knowledge of the site);
- Regulators and the public must be notified of an opportunity to participate in the MRSPP process (required by CFR Part 179.5) and this must be indicated using the check boxes in NORM. In order to check the stakeholder participation box, at a minimum, a public notice specifically addressing MRSPP scoring must have been published. Similarly, RPMs must have documentation of a regulator's concurrence (e.g., e-mail or letter) before the regulatory participation box can be checked;
- If actions have been taken on a site that removes source (MEC/MC), the table scores must be modified accordingly during re-scoring;
- Details must be provided in the Site Description field with respect to site conditions, dates of operation, past uses, munitions use, and locations;
- Backup information must be provided to justify decisions made on each table. Any document references should include specific citations;
- Supporting documentation must be uploaded into the MRSPP Module; and
- AOCs that are grouped under an existing site pending a decision on whether or not to include them as a separate site in NORM should not be scored under the MRSPP Module. However, a site description should be included in the summary narrative portion of CTC and separate hardcopy score sheets should be provided to the QA Panel for discussion.

RPMs should refer to the [DoD MRSPP Primer](#) and the latest version of the DON MRSPP QA Panel Business Rules when developing scores for their MRSs.

The MRSPP requires the DON ERP to:

- Apply the MRSPP to each MRS under its control and assign a relative priority;
- Use the MRS priority and consider other factors (e.g., stakeholder, economic, programmatic) to sequence MR actions; and
- Fulfill specific procedural and administrative requirements (e.g., QA, documentation, reporting, reviewing).

The MRSPP structure includes three evaluation modules, each focusing on the unique characteristics of the specific hazard:

- Explosive Hazard Evaluation (EHE) Module;
- Chemical Warfare Material Hazard Evaluation (CHE) Module; and
- Health Hazard Evaluation (HHE) Module.

Each module is comprised of three categories of information, referred to as factors, which are used to derive the outcome of the module. The three factors, which are similar for each module, allow the project team to examine the source of the hazard, how accessible the hazard is, and any receptors potentially affected by the hazard. This structure is important as it limits the influence of any one factor on the outcome.

Each factor is comprised of multiple data elements that capture MRS-specific information. The data elements classify information essential for the characterization of conditions at the MRS. This information is collected during the early phase of the response process and allows for consistent and supportable results. This is necessary for consistency when determining the relative priority of all MRSs in the DON ERP inventory.

To apply the MRSP, the MRS Project Team inputs MRS-specific data into tables that are provided in the MRSP Primer. The tables guide the MRS Project Team through recording information for the data elements in each module. This ensures that the MRS Project Team considers each of the three primary hazards posed by UXO, DMM, or MC. These tables are also available in the NORM MRSP Module.

An MRS's relative priority is determined by comparing the ratings of the hazard evaluation modules (EHE, CHE, and HHE) applied to an MRS. As long as one of the three modules can be applied to an MRS, an MRS can be assigned a priority. The MRSP is reapplied to an MRS when data to complete any module not evaluated become available. A completed response action, further MRS characterization, or changes in nearby land use might also necessitate the MRSP's reapplication. Each MRS is assigned a relative priority based on the greatest potential hazards posed by UXO, DMM, or MC. A Priority 1 MRS contains the highest potential hazard, while a Priority 8 MRS contains the lowest potential hazard.

The sequencing of an MRS for action will be based primarily on its relative priority. As a matter of DoD policy, MRSs with higher relative priorities will be addressed before MRSs with lower relative priorities. However, both DoD and Congress recognize that other factors such as community interests and value of land for development could also influence sequencing decisions. As such, the MRSP allows other factors to be considered. Once the MRS priority is determined, the DON ERP may consider other factors including, but not limited to, environmental justice, economic development, and programmatic concerns when determining the MRS's sequence for response actions. These factors do not change the MRS's relative priority, but may influence sequencing decisions.

RPMs should refer to the [DoD MRSP Primer](#), the NAVFAC BMS, and the latest version of the DON MRSP QA Panel Business Rules when developing scores for their MRS.

#### **4.3.3 Base Realignment and Closure Site Prioritization**

Although the RRSEM and MRSP are considerations in the prioritization of BRAC sites, an important objective at BRAC installations is to support reuse by making property environmentally suitable for transfer in accordance with CERCLA requirements. Therefore, reuse needs and priorities, as well as property transfer and redevelopment plans, are normally the major factors evaluated when sequencing cleanup activities at BRAC installations, along with relative risk.

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## Chapter 5

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### CERCLA Environmental Restoration Process

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All ER response actions shall, to the greatest extent possible, be carried out in accordance with the provisions of the NCP, codified in 40 CFR Part 300. The NCP addresses the methods for discovering, evaluating, remediating, and determining the criteria for appropriate cleanup, and for ensuring that response action measures are cost effective. ER efforts at DON installations generally follow the process established by CERCLA; therefore, this Manual is focused on CERCLA processes and requirements. The DON ERP establishes phases and milestones, which are executed in partnership with the stakeholders for site response actions to achieve SC.

Specific requirements for sites where MEC/MPPEH may be encountered are detailed in Chapter 12. When sites involve materials governed by other regulatory programs such as RCRA or the petroleum UST program, those regulations shall be complied with as applicable. Details on these other regulatory programs are provided in Chapter 13.

#### 5.1 Partnering and Stakeholder Participation

To meet the goals of the DON ERP, DON partners with regulatory and community stakeholders to foster better relationships and maintain open lines of communication. Partnering also helps DON promote the use of innovative technologies to enhance the effectiveness and efficiency of environmental cleanup.

Partnering with federal and state regulators is generally accomplished through a regional tiered approach. Tier 1 is completed at the project manager level, Tier 2 includes first line supervisors, and Tier 3 brings in regional senior program managers to resolve major site level problem areas that Tier 1 and 2 teams could not resolve. In addition, DON conducts annual Environmental Managers Executive Committee meetings with EPA Regions 1, 9 and 10 and the corresponding regional state agencies to enhance understanding of overall program priorities, objectives, and strategies.

Stakeholder involvement includes participation in RABs and public reviews; reviewing/commenting on reports, Proposed Plans (PPs), and DDs; and providing input into land use planning for parcels being transferred from federal control.

DON has found that the use of RABs is an effective means of promoting stakeholder participation, including interaction with the community. DON uses RABs as the primary mechanism to ensure that individuals within the community not only have access to information relevant to ER but also can participate in the decision-making process. Promoting interaction with the community, regulators, and other stakeholders early in the process helps to ensure that response actions proposed by DON gain stakeholder acceptance.

#### 5.2 CERCLA Phases and Milestones

The DON ERP process starts with identification and investigation of contaminated sites, followed by selection, design, and implementation of RAs to achieve remediation goals. A “site” in the DON ERP is defined as the full lateral and vertical extent of the release of a hazardous substance or pollutant or contaminant to the environment. The boundaries of a site can change over time. The boundaries of a site can be fully contained on the installation or extend beyond the installation boundaries. This process is designed in accordance with CERCLA requirements. The phases and milestones in this process are shown in Figure 5-1, and are briefly described below. Subsequent sections provide further information about conducting these phases and documenting milestones.



Preliminary Assessment/Site Inspection (PA/SI): This phase identifies contaminated sites based mostly on the review of the existing information about hazardous waste disposal practices at an installation to determine if a release is known, or suspected, to have occurred at a site. Limited field data may be collected to determine the nature of any releases and any potential threat to receptors. During this phase, the data may be compared to risk-based benchmarks to define chemicals of potential concern (COPCs). If the PA/SI data screening does not identify any COPCs, the site does not pose an unacceptable risk to human health or the environment and should be designated as requiring NFA. The NFA designation is also referred to as “no further remedial action planned”. If the PA/SI data screening identifies COPCs, the site may pose a potential risk to human health and the environment and a removal action may be conducted, or the site moves into the RI/FS phase.

Remedial Design (RD): This phase involves preparing the detailed design of the RA selected in the ROD/DD.

Remedial Action Operation (RA-O): This phase involves O&M and monitoring actions for the remediation system and site. The RA-O and LTMgt phases may also include implementation and management/maintenance of LUCs. These LUCs must be defined as, or be part of, the selected RA in the ROD or DD. Periodic monitoring reports are prepared during this phase to document performance of remediation systems.

Long-Term Management (LTMgt): Following the RC milestone, this phase may be required to monitor long-term protectiveness of the remedy. Actions during this phase may involve groundwater monitoring, implementation and management of LUCs, and preparation of five-year review reports. The LTMgt phase is also required when the cleanup goals do not allow unrestricted use.

## **Milestones**

Record of Decision (ROD)/Decision Document (DD): Following completion of the RI/FS phase, the preferred alternative is documented in a PP for public comments and all required RAs are documented in the ROD/DD. The ROD/DD includes a summary of the nature and extent of contamination and associated risks, selected remedy, remedial action objectives (RAOs), the rationale for selecting the remedy, and an exit strategy. For non-NPL sites, a DD may be prepared in place of a ROD with similar scope as a ROD, but with the state as the lead regulatory agency. Chapter 9 of this Manual describes the preparation of RODs and DDs in detail.

Remedy in Place (RIP): This milestone is achieved when the construction of a long-term remedy is complete and the remedy is operating as planned to meet project RAOs in the future, or a short-term remedy has been successfully implemented and the final documentation is being prepared. Determination of achieving the RIP milestone is a DON decision and regulatory concurrence for this milestone is not required.

Response Complete (RC): This milestone is achieved when all cleanup goals specified in the ROD or DD are complete. For remedies requiring the RA-O phase, this milestone indicates completion of the RA-O phase.

Site Closeout (SC): This milestone signifies that DON has completed active management and monitoring at a site, the remedy is protective of human health and the environment, contaminant levels at the site allow for unlimited use and unrestricted exposure (UU/UE), and there is no expectation of expending additional ER,N or BRAC funds at the site. The SC milestone can occur at any stage during the response action, depending on the remediation requirements, including at the completion of the PA/SI, removal action, RI/FS, RA-O, or LTMgt phases. Further information on SC can be found in DON [Guidance to Documenting Milestones throughout the Site Closeout Process](#) (Users Guide [UG]-2072-ENV).

## **5.3 Types of Response Actions**

The CERCLA definition of a response action encompasses removal actions and RAs, and includes any action to prevent or minimize the release of hazardous substances so that they do not migrate and cause substantial danger to present or future public health/welfare or the environment (CERCLA §101 [24]). Although the intent of removal actions and RAs is the same (i.e., to protect human health and the environment), the rationale for selecting a given approach is distinct.

In situations where prompt action is required to address releases or a threatened release, the NCP allows for the implementation of a removal action to be performed in an expedited manner. A removal action could be either the final remedy or an interim action, followed by a longer-term RA as the final remedy. RAs are taken to permanently and significantly reduce the dangers associated with releases or threats of releases of hazardous substances that are serious, but not immediately life threatening.

Interim RAs are undertaken as a component of a larger remedy prior to the selection of the final remedy. The interim RA decisions are documented in an Interim ROD and are treated as a partial solution to a complex (e.g., multi-media) contaminant problem or as an RA at one site included within a multi-site OU. A summary of these interim actions is included in the final ROD. Because of the interim status, implementing an interim RA does not meet the RIP or RC milestones. However, if an interim action



becomes the final action through a final ROD, then the remedy can meet the metric for achieving RIP or RC.

A response action includes any investigation, evaluation, decision making, or implementation step in support of either a removal action or RA. Implementation steps may include, but are not limited to:

- Removing hazardous materials from a site for treatment or containment;
- Containing the waste safely on-site;
- Treating the waste on-site;
- Identifying and removing the source of contamination;
- Halting further migration of contaminants;
- Monitoring;
- Making provisions for alternate water supplies; and
- Implementing measures to limit public access.

The actual sequence, timing, and scope of response actions are tailored to specific site conditions and DON ERP funding priorities. Some guidelines include the following:

- A site consists of a single unit where hazardous substances have been deposited, stored, disposed of, or placed. A site is the basic unit for planning and implementing response actions;
- Multiple sites grouped according to type, potential for a common remedy, proximity, contamination of a common resource, or funding priority indicates they should be evaluated or remedied together as an OU (see Section 8.1.2 for additional OU information); and
- Funding priorities and the sites' relative risk rankings influence how many sites can be addressed together and in what timeframe.

## Chapter 6

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### Preliminary Assessment/Site Inspection

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The PA/SI phase of the response action process evaluates potential DON ERP sites at an installation to determine if a site should be considered for removal action or further response action. This determination is based on an assessment of whether there has been a release subject to CERCLA §104, defined as: (a) any hazardous substance (as defined under CERCLA; 40 CFR Part 302.4, Designation of Hazardous Substances) released or where there is a substantial threat of such a release into the environment; or (b) a release or substantial threat of release into the environment of any pollutant or contaminant which may present an imminent and substantial danger to the public health or welfare. Note that CERCLA §101(14) provides a “petroleum exclusion,” which is the term used for EPA’s exclusion of “oil” from the definition of a “hazardous substance.” (The term “oil” here includes refined petroleum products such as gasoline, diesel, jet fuel, etc.). Therefore, spills and leaks of only such petroleum products are not considered in this chapter because these types of sites would not be addressed under the CERCLA process. However, some waste oil tanks may contain chlorinated solvents or other CERCLA hazardous substances, or the releases may be commingled with other CERCLA hazardous substances, in which case the petroleum exclusion does not apply.

The PA/SI is initiated when EPA lists an installation on the Federal Facilities Agency Hazardous Waste Compliance Docket (i.e., the Docket), DON discovers a waste disposal site or potential release, or a petition is made by an affected person. The discovery and notification step initiates the processing of a newly discovered release or hazardous waste site under the DON ERP. As part of the assessment, a screening-level risk assessment may be performed. In addition, the information gathered during the PA/SI may be used to determine the relative risk ranking of a site to establish program funding priorities. The findings of the PA/SI are used to determine if the site should be eliminated from further consideration (i.e., NFA), identified for a removal action to address actual or imminent threats to human health or the environment, or further evaluated through the performance of RI/FS. EPA also uses the information gathered during the PA/SI to facilitate the evaluation of a release in accordance with the Hazard Ranking System (HRS). Section 6.2.3 describes the process used to determine if a site should be listed on the NPL.

#### 6.1 Preliminary Assessment

A PA is required for an installation not already on the Docket if a release site is discovered, a hazardous waste site is discovered, or a person successfully petitions EPA. The purpose of the PA is to:

- Eliminate sites that do not pose a threat to human health or the environment from further consideration;
- Determine if there is a potential need for removal action;
- Set priorities for SIs; and
- Gather information for the HRS evaluation.

A PA is intended to be a relatively quick, low-cost compilation of existing information about a site. It should assess the following:

- Potential source and nature of a release;
- Potential contaminant migration via five pathways (surface water, groundwater, air, soil, and sediment); and

- Potential receptors (humans and ecological resources) that could be affected by the release or contaminant migration.

Sampling generally is not conducted during a PA, but may be appropriate if it could avoid the need for an SI (i.e., when an SI may be justified based on available information, but sampling is expected to find little evidence of a threat, in which case sampling during the PA could negate the need for a formal SI). EPA guidance on performing combined sampling as part of the PA is discussed in [Improving Site Assessment: Combined PA/SI Assessments](#) (OSWER 9375.2-10FS). As described in this guidance, EPA encourages combining the PA and SI activities, or conducting Integrated Assessments (IAs), to reduce repetitive tasks and, ultimately, costs. For information on IAs, see EPA guidance [Improving Site Assessment: Integrating Removal and Remedial Site Evaluations](#) (OSWER 9360.0-39FS). As is the case with its individual components, a combined PA/SI assessment is performed to determine what steps, if any, need to occur next at a site.

### **6.1.1 Information Included in Preliminary Assessments**

The types of information presented in a PA are identified in EPA guidance. The following are key types of information and resources considered in preparing the PA:

- Installation description (physical inspection, interviews, maps);
- Evidence of a release or potential release (physical inspection, interviews, record searches);
- Site description and characterization (physical inspection, record searches, photo analysis, previous sampling or studies);
- Identification of potential receptors (e.g., drinking water wells and intakes, sensitive environments, populations);
- Description of hazardous waste generation, storage, and disposal, both past and present (interviews and record searches);
- Hydrology (literature searches, previous studies, Federal Emergency Management Agency flood maps);
- Hydrogeology (literature searches, previous studies);
- Soil characteristics (U.S. Department of Agriculture soil survey, previous boring records);
- Prior regulatory actions such as permits, inspections, violations, removals (interviews, record searches); and
- History of on-site and adjacent land use/ownership (interviews, record and literature searches).

An annotated bibliography should be provided in a PA to allow information to be easily located for review.

### **6.1.2 Assessment Included in Preliminary Assessments**

The RPM uses information in the PA to recommend whether a further response action is justified. Factors to consider are the probability of release to a pathway, the probability that receptors are being or will be exposed, and the probable health risk due to this exposure.

In addition, the information gathered during the PA should be used to formulate a preliminary conceptual site model (CSM). As detailed in Section 8.1.1, a CSM is a useful engineering tool to manage site information and guide decision making throughout the DON ERP process. The CSM summarizes the site conditions, the distribution of COPCs, potential receptors and exposure pathways, and land use data available for a given site.

### 6.1.3 Conducting Preliminary Assessments

EPA guidance on PAs is found in [Guidance for Performing Preliminary Assessments under CERCLA](#) (OSWER 9345.0-01A) and [Improving Site Assessment: Abbreviated Preliminary Assessments](#) (OSWER 9375.2-09FS). This guidance is intended for industrial facilities, and should be applied, as applicable, to DON installations. The [Federal Facilities Remedial Preliminary Assessment Summary Guide](#), developed by EPA, is specific to federal facilities to assist agencies in conducting remedial PAs to obtain the information needed for determining whether further action is necessary at a site. This Guide does not replace or amend the previously mentioned PA guidance, but rather highlights key data and reporting parameters to be considered in conducting a PA at federal facilities in accordance with the aforementioned PA guidance and NCP.

The servicing FEC provides a draft PA to the installation CO. Unless otherwise specified in the FFA, following completion of the PA, the RPM sends a copy of the PA to the EPA Regional Office. EPA may request modification, additional information, or completion of an SI following review of the PA.

The RPM, in coordination with the installation, determines whether newly discovered sites at installations with ongoing DON ERP work will be considered new sites or will be remediated as part of existing sites. To do this, the installation and RPM need to consider the following factors:

- Whether the origin and type of contaminant are similar;
- How compatible the investigation techniques are for the sites;
- How integration would affect the cost, scheduling, and management of ongoing activities;
- How human health and the environment would be impacted; and
- How regulators may respond to the RPM's approach.

The PA may result in one of the following outcomes:

- NFA – If no significant threats are identified, NFA would be taken;
- SI – If sufficient evidence of a potential release exists;
- Removal Action – If a significant threat to human health or the environment exists or is imminent, the contamination may have to be physically removed immediately or otherwise controlled; and
- RI/FS – If DON determines that a site warrants remediation, the SI can be skipped and the site can go directly to RI/FS.

## 6.2 Site Inspection

A SI is needed if the PA demonstrates evidence of a potential release. The SI is an on-site investigation intended to gather more information to determine whether there is a release or potential release, and to characterize the nature of the release and associated threats or potential threats to human health and the environment. The SI can be structured to test the critical PA conclusions that resulted in the recommendation for the SI. The information collected during the SI may be sufficient for DON to determine if NFA is warranted. These decisions require sufficient information to define present and past site waste operations and site conditions resulting from waste operations. EPA guidance on SIs is found in [Guidance for Performing Site Inspections under CERCLA](#) (OSWER 9345.1-05).

The SI phase provides the first opportunity to generate current site characterization data by collecting and analyzing samples. The objective of the SI sampling effort is to verify the presence of contamination, not to determine the extent of contamination. The SI consists of a visual inspection of the site, usually includes sample collection and analysis, and may include off-site surveys. Sampling and surveys may be performed

both on and off the installation, as necessary, to determine the presence and nature of potential contamination in the soil, groundwater, surface water, and air as described in the following:

- **On-Site Sampling and Surveys:** Performed to determine the nature of any releases of disposed or stored wastes (source identification). Appropriate soil, air, groundwater, surface water, and sediment samples should be collected in the vicinity of any suspected source and along expected migration pathways to determine the existence of contamination. For example, a subsurface vapor source should be identified before sampling indoor air. On-site surveys should identify adjacent land ownership, land use, water supplies, waste disposal practices, and potential receptors; and
- **Off-Site Sampling and Surveys:** May be necessary to assess potential contamination migration to off-site receptors, and may include off-installation areas. Examples of off-site sampling include background samples, or a downgradient well placed outside of the established site boundaries. The samples may consist of air, soil, groundwater, surface water, and sediment samples. Off-site surveys may be conducted to assess the population, land use, and operations that may be affected by releases from the site. These surveys should consider the same parameters used for on-site surveys, but focus on any wastes that may migrate off the site.

Upon completion of the SI, a report is prepared to document the findings of the SI. At a minimum, the results documented in the report should:

- Define the source and nature of the release;
- Describe pathways for contaminant migration;
- Identify human and ecological receptors;
- Conclude whether an NFA determination, a removal action, or an RI/FS is warranted; and
- Establish an AR File (Section 15.1).

The documents used and reviewed in carrying out the SI should be referenced as a part of the SI report. Documentation of the background information is critical for an NFA decision or to substantiate the recommended action to be followed after the SI. The information contained within the report also should be used to update/refine the CSM initiated during the PA phase.

### 6.2.1 Sampling and Analysis Plan

The Sampling and Analysis Plan (SAP) is developed to document project objectives and the associated sampling and analysis strategy and will address on-site sampling, off-site sampling and off-site surveys. It should be noted that the SAP is commonly used in many phases of ER projects and specific guidance is referenced below.

SAPs are developed in accordance with [Uniform Federal Policy for Quality Assurance Project Plans Manual](#) (UFP-QAPP Manual; EPA/505/B-04/900A) requirements. These requirements incorporate QA/QC procedures applicable to the collection of any field or laboratory data collected during the SI, and are employed to ensure that data meet project data quality objectives (DQOs), and are adequate for use in the site evaluation and the EPA HRS scoring activities.

As part of the response action, the NCP requires that the nature and extent of site risks to human health and the environment be characterized through HHRAs and ERAs. The DON ERP has defined a three-tiered approach that follows EPA guidance for both HHRA and ERA processes to assess risks at a site. Although sometimes done in the RI phase of the ER process, a Tier 1 Screening Risk Assessment (SRA) is generally

completed as part of the SI to identify any COPCs that may pose unacceptable human health or ecological risks.

The SRA is a conservative evaluation consisting of a review of existing information and current data about a release, including the source and nature of the release, pathways of exposure, and potential receptors, as documented in the CSM developed during the PA/SI. Further details on the Tier 1 SRA process can be found in Section 8.3.3 and in the NAVFAC BMS. Detailed guidance on conducting risk assessments can also be found on the [NAVFAC ERB website](#) under [Risk Assessment](#).

If an actual or imminent threat to human health or the environment is identified as a result of the SRA, then a removal action may be warranted. This will involve immediate communication with all stakeholders to include staff at the installation. Alternatively, if the SRA determines that there are no unacceptable human health and ecological risks, then the results are documented in the SI Report and the site can be closed out at the end of the SI. Otherwise, the site is further addressed in an RI/FS. This information also may be used by DON to determine which sites need cleanup action the soonest (i.e., “worst first”).

### **6.2.2 Data Management and Visualization**

NAVFAC has developed the web-based NIRIS to manage all ER data and ensure data quality. The NIRIS system is described in Section 15.7.3, including how data that are collected during a PA or SI shall be submitted, and the tools available for data analysis and visualization using geographic information systems (GIS). These tools help RPMs and contractors correlate large volumes of data, effectively analyze spatial data distributions, and generate maps during a PA/SI.

### **6.2.3 Hazard Ranking System and National Priorities List Determination**

After the PA/SI is completed and the findings are sent to the Federal Facilities Docket coordinator of the cognizant EPA Region, EPA determines whether the PA/SI is acceptable or whether additional information is required. Once EPA considers the PA/SI to be acceptable, it determines whether a site should be eligible for the federal facilities section of the NPL based on the results of the HRS score. EPA generates the official HRS score using HRS Quickscore, which uses the information from the PA and the SI to generate a score based on the level of the facility’s potential threat to human health and the environment for each of four migration and exposure pathways (groundwater, surface water, soil, and air). If the site’s HRS score exceeds a predefined threshold value, it is eligible for the NPL. EPA proposes new NPL sites in the FR. After receiving and responding to stakeholder comments on the proposed NPL additions, EPA determines whether the available information still supports the addition of a site to the NPL. Most DON installations have already been evaluated using the HRS and added to the NPL as appropriate.

### **6.2.4 Site Closeout During Preliminary Assessment/Site Inspection**

The investigations and data evaluation conducted during the PA and SI may determine that a site does not pose an unacceptable risk to human health and the environment. These sites do not require further investigation or response and are designated as NFA sites, and achieve SC at this stage of the process. Designation as an NFA site requires that the supporting information be well-documented and include the rationale for the NFA determination. Technical reports prepared for the PA/SI should provide sufficient information to support the NFA determination for these sites. The RPM should make every attempt to gain concurrence on the NFA designation from the regulatory authority in the form of a letter or a signature page of the technical report(s) providing information about the relevant sites. These letters or signature pages are not required under the existing guidance or CERCLA, but are highly desirable to document NFA concurrence. If regulatory concurrence cannot be gained, the RPM with approval from

the ER Manager should document the DON's designation of the site as NFA in a memorandum to the AR file and include all supporting information, rationale, conclusions, and written attempts for concurrence.

The sites designated NFA from the PA/SI may also be included in a ROD/DD for the relevant OU, or in other RODs/DDs at the same installation, if acceptable to the stakeholders. This approach provides an additional level of concurrence and documentation beyond the concurrence letters based on the PA/SI technical reports. Although some additional costs will be required to include these sites in a ROD/DD, such costs may be justified. In particular, including these sites in a ROD/DD provides additional assurance that the site cannot easily be reopened because the ROD/DD is a legally binding document. The RPM should evaluate the costs and benefits of adding these sites in a ROD/DD on a site-specific basis. Additional information on documenting SC can be found in DON [Guidance to Documenting Milestones throughout the Site Closeout Process](#) (UG-2072-ENV).

#### **6.2.5 Administrative Record File**

Most existing facilities have an AR file in place which must include all final documents from the PA/SI. For facilities without an AR file, one shall be established when a decision is made that an RI/FS is needed. AR file requirements are described in Section 15.1.

## Chapter 7

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### Removal Action

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A removal action is a response implemented in an expedited manner to address releases or threatened releases that require prompt action. CERCLA §104 provides that removal actions and subsequent RAs should occur whenever there is a release or the threat of a release of a hazardous substance or any pollutant or contaminant that presents a substantial danger to the public health and welfare (42 USC §9604 (a)(1)).

This chapter examines how to determine whether a removal action is required, the different types of removal actions, and how removal actions should be considered as part of the long-term remedy for a site. More detail on removal actions can be found in the NAVFAC BMS.

#### 7.1 Determining the Need for a Removal Action

In determining the appropriate extent of a response action for a given release, DON first reviews current site conditions as well as any information produced by a study or investigation of a site, including a PA/SI, or an RI if previously completed. At sites where results indicate there is a release or threat of release into the environment of a hazardous substance, or a release or threat of release into the environment of a pollutant or contaminant which may present an imminent and substantial danger to human health or the environment, a removal action may be warranted to “abate, prevent, minimize, stabilize, mitigate, or eliminate the release or the threat of a release” (40 CFR Part 300.415). The following factors are considered in determining the need for a removal action:

- Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers that may pose a threat of release;
- Threat of fire or explosion;
- Actual or potential direct exposures to nearby human populations, animals, or the food chain from released hazardous substances or pollutants or contaminants;
- Actual or potential contamination of drinking water supplies or sensitive ecosystems;
- High levels of hazardous substances or pollutants or contaminants in surface soils that may migrate;
- Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released; and
- Other situations that may pose threats to human health or the environment.

DON also considers the following criteria for determining if a removal action is appropriate:

- Whether the source of the contamination can be removed quickly and effectively;
- Whether access to contamination can be limited (human exposure is substantially reduced); and
- Whether a removal action is the most expeditious manner of remediating the site.

The removal action should be compatible with future RAs and should strive to meet ARARs. Compliance with ARARs depends on the urgency of the situation, and the scope of the removal action to be conducted (40 CFR Part 300.415).



## 7.2 Strategic Considerations

When evaluating the need for a removal action, an additional consideration is the potential economic benefit if the removal action reduces risk and long-term threats sufficiently to serve as the final remedy. Although removal actions are not intended to circumvent the normal RI/FS process, in some cases, a removal action can be used to achieve the objective of a protective SC at a cost far less than performing an RI/FS and related risk assessment. In other cases, particularly for larger and more complex sites, more specific site characterization, risk screening/risk assessment, and evaluation of remedial alternatives may result in a lower cost for achieving protective SC. In these cases, the more extensive work performed as part of an RI/FS may indicate that:

- The site does not pose an unacceptable risk (i.e., NFA is appropriate);
- The site can be remediated more efficiently by alternate, perhaps innovative, technologies; or
- Site conditions and contamination are so complex that the proper course of action is to manage the risk with containment, monitoring, and LUCs.

Economics play an important role in determining whether to conduct a removal action or proceed with the RI/FS process. Economic considerations also may impact the extent of the action that is taken. In some cases, expanding the scope of the removal action may allow the action to be the final remedy. The following should be considered when deciding whether the removal action should be an interim or final action:

- The cost of remobilizing to conduct the final action;
- The level of uncertainty of site conditions and remedy performance and the estimated life-cycle costs of the additional work that may be required to achieve final cleanup levels, including appropriate contingencies for such uncertainties;
- The potential to reduce total life-cycle costs following the initial threat elimination by reducing uncertainties related to the site conditions and remedy performance, (e.g., performing more detailed site characterization, risk assessment, and evaluation and selection of a potentially more optimal remedial alternative for the final cleanup);
- The uncertainty associated with acceptance of cleanup levels as final; and
- The availability of funds to conduct the action.

When implementing a removal action, whether it is an interim or final action, it is recommended that the site is characterized in enough detail to perform risk screening, define the limits of the removal action in advance, and develop a risk-based exit strategy. See Section 8.3.1 for information regarding site characterization (including development of necessary documentation) and the development of risk-based exit strategies. Open-ended removal actions involving cleanup of successive areas based on analysis of individual samples that exceed specified criteria such as preliminary remediation goals (PRGs) should be avoided as this could result in escalating and non-controlled costs. In any case, both removal actions and RAs are subject to the [Policy for Optimizing Remedial and Removal Actions at all DON Environmental Restoration Program Sites](#) to help ensure that the response action is performed in a cost-effective manner.

## 7.3 Types of Removal Actions

Removal actions that may be used to respond to a release or potential release are listed below; this list is not exhaustive and does not prevent DON from taking any other actions deemed necessary under CERCLA.

- Fences, warning signs, or other security or site control precautions put in place if humans or animals have access to the release;
- Run-off or run-on diversion controls used to prevent the further spread of contamination where precipitation or runoff from other sources may enter the release area;
- Capping of contaminated soils or sludges to reduce migration of hazardous substances into soil, groundwater, and air;
- Use of chemicals, absorbents, and other materials to retard the spread of the release or mitigate its effects;
- Stabilization of berms, dikes, impoundments or drainage/closing of lagoons to maintain the integrity of structures;
- Excavation, consolidation, or removal of highly-contaminated soils from drainage areas or other areas to reduce the spread of or direct contact with contamination;
- Removal of drums, barrels, tanks, or other bulk containers that contain or may contain hazardous substances or contaminants to reduce the likelihood of spillage, leakage, or exposure to humans, animals, or the food chain, or fire or explosions;
- Containment, treatment, disposal, or incineration of hazardous materials to reduce the likelihood of human, animal, or food chain exposure; and
- Provision of an alternative water source to reduce exposure to contaminated water until a permanent remedy can be implemented.

Removal actions implemented in response to an imminent threat are not required to be compatible with future RAs, to be cost-effective, or to achieve ARARs if the urgency of the situation precludes fulfilling these goals. However, these goals should be considered prior to implementation of a removal action if time allows.

If DON determines that the removal actions will not fully address the threat or potential threat posed by the release, DON will ensure an orderly transition from removal to remedial response activities. All decisions to implement removals under CERCLA authority shall be documented. Documentation may follow the decision to implement the action, or even the action itself, depending on the urgency of the situation. A removal action may or may not be the final action for a site, depending on whether any hazardous substances or pollutants or contaminants remain after the removal.

EPA categorizes removal actions in three ways: (1) emergency removal actions, (2) TCRAs, and (3) non time critical removal actions (NTCRAs) (see the [CERCLA/Superfund Orientation Manual](#) [EPA/542/R-92/005]). These categories are based on the type of situation, the urgency of the threat of the release, and the planning period that exists before the action is initiated.

### **7.3.1 Emergency Removal Actions**

Emergency removal actions are necessary when a release requires that on-site activities begin within hours or days. Emergency removal actions are types of TCRAs that must be conducted immediately and can be initiated using verbal authorization. Upon becoming aware of the need for an emergency removal, the RPM shall do the following:

- Notify the chain of command, including NAVFAC HQ, which in turn will notify CNO N45 and/or CMC(LF), along with CNIC and/or MCICOM via the installation chain of command who will involve the Public Affairs Office;

- Notify EPA, state, and local officials as soon as practicable;
- Prepare documentation briefly summarizing the conditions at the site and identifying the selected removal action and the rationale for the selection (if there is sufficient time);
- Begin on-site removal action;
- Prepare and publish a notice of availability of the AR file, including the Action Memorandum (AM), in a major local newspaper within 60 days after initiation of removal action;
- Provide for a 30-day comment period on the AR file;
- Include written responses to significant comments in the AR file;
- Ensure that a formal CIP is in effect if the emergency removal action is expected to extend beyond 120 days from the initiation of the on-site removal action; and
- For situations where there is insufficient time to prepare documentation prior to initiating removal action on active installations, obtain verbal approval from the installation CO or their designee. For such a situation, prepare documentation following the removal action (40 CFR Part 300.415).

### **7.3.2 Time Critical Removal Actions**

TCRAs are those actions for which the planning period is six months or less before fieldwork is initiated. In this case, an EE/CA is not required, although it is still important to have an appropriate work plan to implement the removal action to mitigate the threat. TCRAs are normally small-scale, interim actions but they can be large-scale, final actions. With TCRAs, RPMs are responsible for the following:

- Coordinating actions to be taken with the affected installation;
- Ensuring that an AR file, including the AM has been established for the action to be taken at the site, and the public has been informed of its existence by publishing notice of the proposed action in a major local newspaper within 60 days of the initiation of the on-site removal activity;
- Providing for a 30-day comment period on the AR file following publication;
- Preparing written responses to significant comments for inclusion in the AR file;
- Ensuring that information relating to the removal action is added to the record and that the public is informed of this addition; and
- Commencing the on-site removal action.

For removal actions where on-site action is expected to extend beyond 120 days from initiation of on-site activities, the NCP requires community involvement activities (40 CFR Part 300.415[n]).

### **7.3.3 Non-Time Critical Removal Actions**

NTCRAs are conducted when a removal action is determined to be appropriate, but a planning period of at least six months is available before on-site activities will begin. RPM responsibilities for NTCRAs include all actions required for a TCRA as well as the following:

- Preparing an EE/CA, or its equivalent, to provide a brief analysis of the removal alternatives for the site. Recommending criteria for evaluating potential removal alternatives including effectiveness of the action to minimize or stabilize the threat to public health, risk to the environment (through a streamlined risk evaluation analogous to the baseline risk assessment

conducted during the RI phase), consistency with anticipated final RA, consistency with ARARs, cost-effectiveness, and ease of implementation;

- Developing a SAP with both field sampling and QA/QC components, and forwarding the plan to EPA for NPL sites or the state for non-NPL sites for review and comment;
- Developing a HASP and forwarding it to the regulators if requested or required by negotiated agreements;
- Continuing with the removal program activities if the regulator does not provide timely review of the SAP and HASP, noting in the AR file that DON formally provided the regulator with an opportunity to review the plans;
- Preparing a notice of availability of the AR file and the EE/CA, along with a brief description of the EE/CA, for publication in a major local newspaper of general circulation, providing at least a 30-day comment period, and preparing written response to significant comments (40 CFR Part 300.820); and
- Preparing an AM for the removal action.

#### 7.4 Cleanup Standards for Removals

CERCLA §104(a)(2) states that removal actions “should, to the extent the President deems practicable, contribute to the efficient performance of any long-term RA with respect to the release or threatened release concerned.” It may therefore be necessary to establish cleanup standards for the removal action. In order to establish cleanup levels for removal actions, a wide variety of technical, legal, economic, and public involvement issues shall be considered. Sources of cleanup standards include:

- **Statutes and Regulations:** Environmental statutes and regulations often provide cleanup levels for removal actions through the ARAR identification process. For example, RCRA, CWA, and SDWA provide cleanup levels for various response action scenarios;
- **Risk-Based Levels:** Standard risk assessment procedures can be used to calculate cleanup levels not only for those contaminants that do not have regulatory cleanup levels but for all contaminants to control the scope of the removal action (see Section 8.3.3 for risk assessment information including a discussion of the Tier 1 SRA that is typically performed as part of the SI); and
- **Cleanup levels used in previous CERCLA RODs/DDs:** Other CERCLA removal and RA RODs and DDs can be used to select cleanup levels for similar situations and similar contaminants.

In some cases, a removal action may not be intended to achieve a cleanup level; therefore, a cleanup level may not even be established for the removal. This could be the case where a removal is implemented for source control or for limiting exposure. This situation requires a permanent remedy, so the removal should be compatible with any RA that may be selected or be cost-effective enough to be considered a reasonable short-term expenditure.

#### 7.5 Future Land Use

Future land use assumptions play an important role in establishing removal action cleanup levels. Anticipated land use assumptions are typically made before completing any CERCLA investigation as the future land use assumed is directly linked to the stringency of cleanup levels. Information regarding land management, including land use planning, is provided in Section 14.1. In addition, the following guidance on land use assumptions is available:

- EPA [Land Use in the CERCLA Remedy Selection Process](#) (OSWER 9355.7-04);

- EPA [Reuse Assessments: A Tool to Implement the Superfund Land Use Directive](#) (OSWER 9355.7-06P). Provides guidance for determining future land use assumptions for CERCLA response actions;
- EPA [Considering Reasonably Anticipated Future Land Use and Reducing Barriers to Reuse at EPA-lead Superfund Remedial Sites](#) (OSWER 9355.7-19). Provides guidance for determining future land use during the CERCLA remedy selection process;
- DoD [Policy on Responsibility for Additional Environmental Cleanup after Transfer of Real Property](#). Provides specific guidance on how to incorporate future land use into the ER process;
- DON [Policy Memorandum 99-02; Land Use Controls \(Interim Final\)](#). Establishes requirements for development and use of LUCs at active and closing bases; and
- DoD [Guidance on Land Use Control Agreements with Environmental Regulatory Agencies](#). Provides a template for LUC agreements.

## 7.6 Decision Documents for Removal Actions

For emergency removals, TCRAs, and NTCRAs, the RPM prepares an AM. For NTCRAs, the AM is supported by an EE/CA. The AM for an interim action specifies what threat is being addressed and how long the action will remain effective. The AM should state what type of final action may be conducted and how the removal action contributes to the implementation of the final action. The AM for final actions should specify the performance standards or cleanup levels to be reached by the actions. Both TCRAs and NTCRAs can be final actions, but emergency removals are seldom final actions.

The installation CO signs the AM for active installation sites. AM documents are signed by the FEC CO for non-BRAC inactive installation sites. For BRAC sites, in accordance with DON [Assignment of Responsibilities to the BRAC PMO and Delegation of Authority Memorandum](#), the BRAC PMOs may delegate signature authority as appropriate. Upon signature, the installation or the BRAC PMO should forward the DD to the appropriate regulatory agencies for information and/or for their concurrence.

## 7.7 No Further Action and Site Closeout Following Removal Actions

A removal action could be either the final remedy or an interim action followed by an RA as the final remedy, based on the extent to which the threats are mitigated by the action. A removal action, when implemented as the final remedy, can be used for fast and significant reductions in risk and to mitigate long-term threats.

In cases where the removal action is the final remedy, the removal action may lead to either RC or SC. If the removal action was conducted during the PA/SI phase and achieves SC, this should be documented by obtaining an NFA determination as part of the PA/SI. If the removal action achieves RC but requires LTMgt, the LTMgt requirements should be documented in a ROD/DD. If the removal action was accomplished during the RI/FS phase, any final determination of RC and/or SC must be documented in the ROD/DD. If a ROD/DD is required, whether it is because LTMgt is needed or because the removal action was done during the RI/FS phase, the nine NCP criteria (see Table 8-4 for information regarding the nine NCP criteria) must be addressed. If it was not addressed as part of the EE/CA or AM, a focused FS is needed, followed by a ROD/DD.

The investigative reports documenting the decision should be forwarded to EPA and state regulators for review and/or concurrence. The NFA determination may be applied at both NPL and non-NPL sites based on appropriate investigation. For NPL or proposed NPL sites, EPA concurrence is required; for non-NPL sites, EPA and state concurrence is recommended.

The NFA determination should be substantiated with an assessment of risk to human health and the environment, taking into consideration health and environmental impacts if NFA is taken. The assessment, usually more qualitative than quantitative, should be based on known characteristics of the contaminants (toxicity, persistence, and mobility), potential pathways of contact/transport (direct contact, air, groundwater, or surface water routes, fire or explosion), types and number of targets, and maximum concentration levels of exposure (as contained in ARARs). This assessment is not a health assessment, which is part of the overall risk assessment process, nor does it have to involve highly analytical procedures such as modeling.

To document the NFA decision and actions taken to substantiate the NFA decision, the following are to be included in the AR file:

- PA Report;
- SI Report;
- EPA concurrence for NPL sites; and
- State concurrence (or a copy of the letter to the regulator requesting concurrence).

NFA documents are signed by the installation CO for active installation sites and by the FEC CO for non-BRAC inactive installation sites. For BRAC sites, in accordance with DON [Assignment of Responsibilities to the BRAC PMO and Delegation of Authority Memorandum](#), the BRAC PMOs may delegate signature authority as appropriate. Upon signature, the installation or the BRAC PMO should forward the DD to the appropriate regulatory agencies for information and/or for their concurrence. Additional information on documenting SC can be found in DON [Guidance to Documenting Milestones throughout the Site Closeout Process](#) (UG-2072-ENV).

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## Chapter 8

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### Remedial Investigation/Feasibility Study

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A site proceeds to the RI/FS phase if the PA/SI concludes that further site evaluation is needed. The purpose of the RI/FS is to characterize the nature and extent of risks posed by release of hazardous substances or pollutants or contaminants (RI) and to evaluate potential remedial options (FS). The RI is the investigative phase of the response action, and begins with site characterization. It is important to note that the required project plans (i.e., UFP-QAPP, RI SAP/Work Plan, and HASP) must be in place before any site work begins. The RPM ensures that project personnel at the FEC and the installation, as well as contractors working on the RI, are familiar with these documents. MRP sites with potential for MEC also require an ESS, and follow the RI/FS process described in Section 12.3.6. Full details on the RI/FS process at MRP sites are available in the NAVFAC MRP RI/FS Guidance.

The primary focus of the FS is to ensure that appropriate remedial alternatives are developed and evaluated in such a manner that the information can be presented to a decision maker and an appropriate remedy can be selected. To the extent possible, the project team should perform the RI and FS as an integrated effort to ensure that data obtained in the RI are appropriate to evaluate likely remedial alternatives during the FS. When the RI is completed independent of the FS and determines that a remedy is necessary, a supplemental investigation can be performed as part of the FS.

The end product of an RI/FS is the comparison of remedial strategies supported by valid site data and a risk assessment, which allows decision makers to ultimately select the most appropriate remedy or combination of remedies for a site.

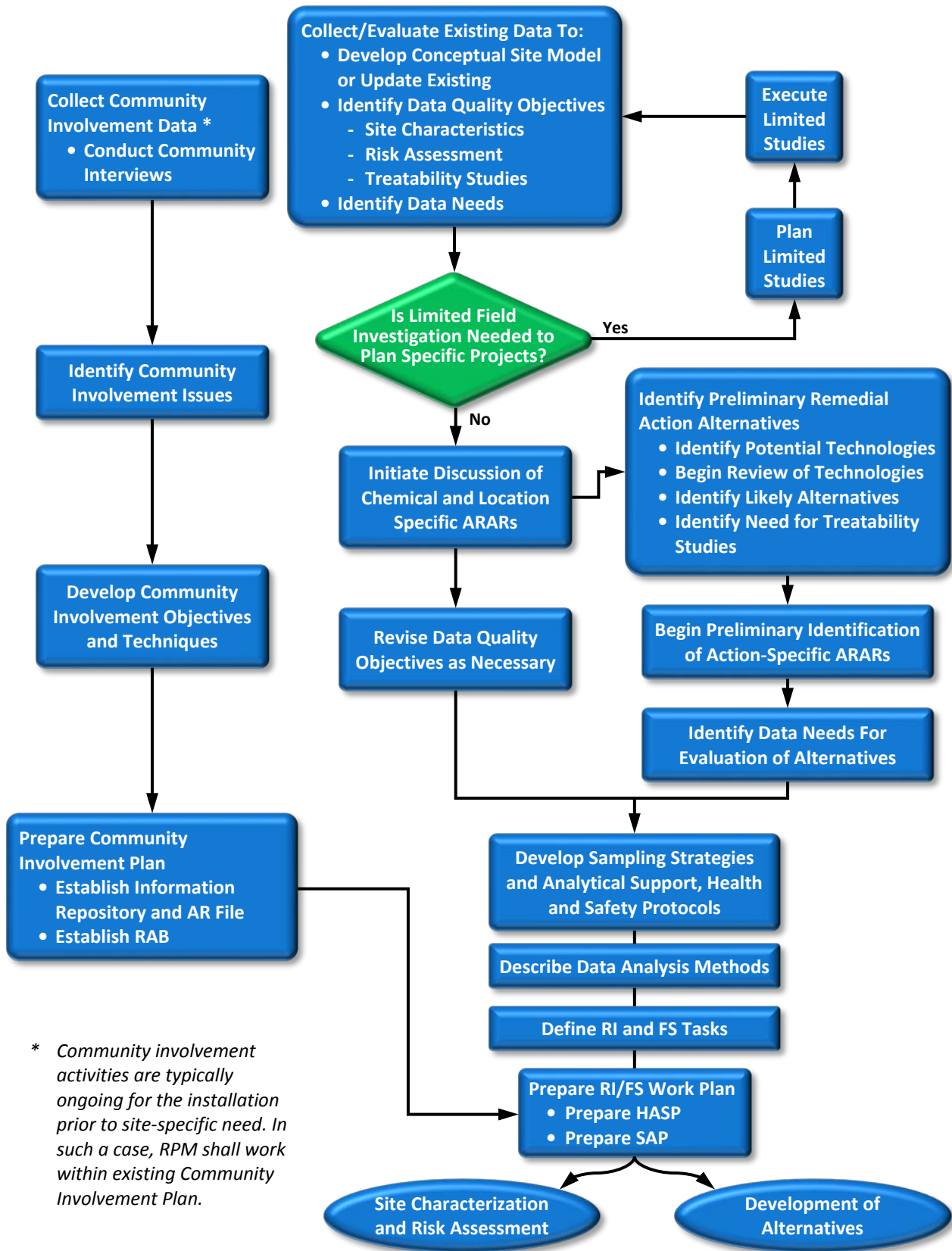
#### 8.1 Remedial Investigation/Feasibility Study Scoping

In order to perform an RI/FS which fully characterizes the nature and extent of contamination, the project team must first identify the scope of the evaluation. Figure 8-1 includes the key elements of the RI/FS that should be included during scoping. Input to the scoping decisions should include but are not limited to:

- **Type of site:** Each contaminated site presents unique challenges. Some have contamination that is confined and easily remediated, while others are substantially more recalcitrant such as a diffuse groundwater plume with dense, nonaqueous-phase liquid (DNAPL);
- **Possible end-states:** Begin the process with the end in mind. If the site type is amenable to a reasonable remediation resulting in SC with UU/UE it should be considered as early as possible in the process. Similarly if the site will likely never reach SC, focusing on the most cost effective protective approach would be appropriate; and
- **Current/Future Land Uses:** Coordination with local installation planning personnel to ascertain reasonable future land use is key for making site decisions. Integrating the land use aspect into the investigation process should allow the highest and best use of limited installation resources (land/water) compatible with mission requirements.

These considerations support the CSM which is an important component of site management throughout the RI/FS and subsequent phases. They are also relevant in identifying the initial project study area.





**Figure 8-1 Key Elements of the Remedial Investigation/Feasibility Study**

### 8.1.1 Conceptual Site Model

The CSM summarizes site conditions, the distribution and concentration of COPCs, important fate and transport properties of the COPCs, potential receptors and exposure pathways, and land use data available for a given site.

The CSM is first developed during the PA/SI phase, but should evolve as new information becomes available (e.g., during the RI and field treatability studies) or as site conditions change, to enhance remedy selection and design. Similarly, during the RA-O and LTMgt phases, the CSM should be updated as performance and monitoring data are collected and analyzed to optimize the remedy as necessary. The CSM is the basis for defining the RAOs, and it also can be used to identify data gaps and aid in development of a SAP and design of the monitoring network. It is very important that the CSM is updated during the RI/FS scoping phase using all available existing data, and documented in the RI/FS SAP/Work Plan. COPCs should also be identified and documented at this time.

A CSM should be developed in consideration of the guidance presented in the NAVFAC SAP Template, and should include the following elements:

- Site history (including release scenario[s], previous investigations, and response actions);
- Nature and extent of contamination (including plume stability, time-series data if available, and MEC for MRP sites);
- Current site use and infrastructure (e.g., occupied buildings, utilities, impermeable surfaces, etc.);
- Geology;
- Hydrogeology;
- Biological and geochemical conditions;
- Potential fate and transport pathways of contamination. It is noted that this element is of particular importance to the CSM as the information provides an understanding of the potential for contaminant natural attenuation, and for understanding contaminant transport (often via leaching and migration through groundwater) which can be a very complex process;
- Background data related to COPCs;
- Resource use (including potential for beneficial use of groundwater);
- Existing and potential monitoring points;
- Potential receptors (human and ecological);
- Potential exposure scenarios and pathways;
- Planned future use;
- Potential areas of unacceptable risk to be addressed;
- Potential target treatment zones;
- Other factors relevant to the understanding of COPCs (and MEC for MRP sites) and related risks/hazards to human health and the environment; and
- Visual imagery that presents site information (e.g., photos, maps, computer-generated graphics).

NIRIS, including GIS and other visualization tools, provides an effective way to maintain, update, and visualize the CSM throughout the life-cycle of the project. The [DON CSM WebTool](#) provides useful

guidance for CSM development, and information is also available in the American Society for Testing and Materials (ASTM) guide: [E1689-95: Standard Guide for Developing Conceptual Site Models for Contaminated Sites](#).

### **8.1.2 Identify Initial Project Study Areas/Operable Units**

A site can be divided into a number of OUs for cleanup, depending on the complexity of the problems associated with the site. A variety of information is used to identify the initial project study areas including, but not limited to:

- Site history that potentially resulted in releases of hazardous substances to the environment;
- The extent to which the source can be adequately identified and characterized;
- Population, environmental, and public welfare concerns, including human and environmental receptors and routes of exposure;
- Amount, concentration, hazardous properties, environmental fate and transport (e.g., ability and opportunities for bioaccumulation, persistence, mobility, and monitored natural attenuation [MNA] and enhanced bioremediation potential), and chemical composition of substances present;
- Hydrogeological factors (e.g., soil permeability, depth to saturated zone, hydrogeological gradients, proximity to a drinking water aquifer, and flood plains and wetlands proximity);
- Current and potential groundwater use (e.g., the appropriate groundwater classes under the system established in the EPA groundwater protection strategy, and any groundwater classifications developed by the state agencies);
- The extent to which the substances have migrated or are expected to migrate from the area of the original location or new location, if relocated, and whether future migration may pose a threat to public health, welfare, or the environment;
- The likelihood of future releases and their impacts to human health and environment if the substances remain on the site;
- The extent to which natural or artificial barriers, including biodegradation and other natural attenuation processes, currently contain the substances and the adequacy of the barriers;
- The extent to which contamination levels exceed criteria and standards that could be considered ARARs or to be considered criteria;
- Impact of the contamination on sediments (see DON's [Installation Restoration Policy on Sediment Investigation and Response Action](#) [Ser 453E/2U589601]); and
- The ability to implement and maintain the remedy until the threat is permanently abated.

## **8.2 Systematic Planning**

All ER projects require a comprehensive planning approach including QA/QC measures to obtain data of appropriate quality for the intended purpose. Systematic planning (as applied to ER projects) is an evidence based approach to site investigation and cleanup. This approach involves investigation, information acquisition, and results assessment, which are key elements of all successful DON ERP projects. EPA's Triad Approach and DQO process are examples of systemic planning.

### 8.2.1 Triad Approach

When performing a scoping investigation either prior to or as part of the RI/FS, it is recommended that the Triad Approach be considered for site characterization and remediation. The Triad Approach is a proven and technically defensible methodology that leverages less expensive field screening/characterization tools and mobile laboratories/analytical equipment in conjunction with an appropriate amount of data from fixed laboratories to manage overall decision uncertainty. The use of field screening methods can extend sampling coverage and reduce sampling error while data from monitoring wells and fixed laboratories reduce analytical error.

Triad refers to three primary components: (1) systematic planning; (2) dynamic work strategies; and (3) real-time measurement systems. Systematic planning includes the identification of decision endpoints needed to support site goals. Implementation of the Triad Approach allows project managers to obtain real-time data to support rapid decision making. The collection of real-time data allows sampling to be continued without a delay and site demobilization/remobilization to occur. The term “real-time” often includes rapid turnaround time (i.e., minutes to hours) that can only be obtained by having analytical instrumentation available in the field, or nearby.

The Triad Approach can be applied to any media, including soil, groundwater, surface water, soil gas, indoor air, and sediment, and is endorsed by EPA. Its use has the greatest impact on subsurface soil, sediment, soil gas, indoor air, and groundwater sampling as these media have high sampling cost and a high degree of variability.

Further information regarding the Triad Approach can be found at the websites [www.triadcentral.org](http://www.triadcentral.org) and [www.clu-in.org/](http://www.clu-in.org/).

### 8.2.2 Data Quality Objectives

The DQO process is consistent with the Triad Approach, as both are methods to structure the project planning processes to manage uncertainty. The DQO process is best applied when critical environmental decisions need to be made (e.g., final decision making, or compliance with a standard).

The DQO process integrates the work of a multidisciplinary team for planning action-oriented environmental data collection activities. It encourages thoughtful consideration of the:

- Decisions that need to be made;
- Data type, quality, and quantity needed to support the decisions;
- Portion of the environment (and/or what timeframe) to be represented by the data;
- Data used to support the decision; and
- Level of decision certainty (and therefore data quality) desired.

The DQO process is iterative and the final outcome is a design for collecting data (e.g., the number of samples to collect, and when, where, and how to collect samples), together with limits on the probabilities of making decision errors. The full DQO process is described in EPA [Guidance on Systematic Planning Using the Data Quality Objectives Process](#) (EPA QA/G-4) and includes the following steps:

1. State the problem;
2. Identify the goal of the study;
3. Identify information inputs;
4. Define the boundaries of the study;

5. Develop the analytic approach;
6. Specify performance or acceptance criteria; and
7. Develop the plan for obtaining data.

Note: DQOs developed for a specific project are often referred to as project quality objectives (PQOs).

### **8.2.3 Sampling and Analysis Plan - Documenting the Systematic Planning Process**

The requirements for documentation of the systematic planning process are provided in the [Uniform Federal Policy for Quality Assurance Project Plans Manual](#) (UFP-QAPP Manual; EPA/505/B-04/900A).

The UFP-QAPP was used as the basis for developing templates for the DON SAP. The DON SAP combines the elements of a UFP-compliant QAPP with the elements of a Field Sampling Plan (FSP). The purpose of the QAPP portion of the SAP is to describe in comprehensive detail the necessary QA/QC, and other technical activities that must be implemented to ensure that the results of the work performed will satisfy the stated performance criteria. The QAPP portion of the DON SAP integrates technical and QC aspects of a project throughout its lifecycle, including planning, implementation, assessment, and RA. The purpose of the FSP portion of the SAP is to detail a “plan of action” for the field sampling effort to ensure that proper sampling techniques are employed to obtain samples that retain their scientific integrity and are legally defensible. The DON SAP documents the activities to ensure that:

- Results of the work performed will satisfy the stated performance criteria;
- Data generated are of the correct type and quality required for the specific decision or use, and will be able to withstand judicial scrutiny should such a need arise; and
- Specified methods generate data that are reliable and scientifically valid.

A clear and comprehensive SAP is integral to documenting RI/FS objectives, sampling and analysis strategy, and data requirements. In support of SAP development, the [NAVFAC Tiered Approach for Developing Sampling and Analysis Plans](#) provides a two-tiered approach. The two tiers represent different levels of complexity and a template is provided for each tier. The [SAP Tier 1 Template](#) is the full-scale SAP template recommended for most RI/FS sampling. The [SAP Tier 2 Template](#) can be used for smaller or less complex sites when authorized by the government regulatory stakeholder, and endorsed by the government chemist or QA officer.

### **8.2.4 Laboratory Quality Assurance/Quality Control**

QA, as it applies to data generation, is generally an oversight function involving a system of activities, including planning, QC, and quality improvement to generate accurate and defensible data. QC consists of the technical activities required to measure and control the quality of the data generated, so that the data meet user needs. Examples of QC “checks” include field blanks, duplicates, and audits.

In accordance with [DoDI 4715.15 Environmental Quality Systems](#) and DoD [Policy and Guidelines for Acquisitions Involving Environmental Sampling or Testing Services](#), laboratories seeking to perform testing in support of the DON ERP need to be accredited with the DoD Environmental Laboratory Accreditation Program (ELAP) prior to use. Current information concerning the DoD ELAP and Environmental Data Quality Workgroup can be found on their respective websites. The DoD ELAP requirements apply to all environmental laboratories, including permanent, temporary, or mobile facilities that generate definitive data for DON ERP, regardless of their size, volume of business, or field of accreditation.

Some ER projects require the use of a mobile laboratory and/or the use of field-deployed analytical devices to obtain important site characterization data. This is particularly important when the Triad Approach is used for rapid site characterization. Few mobile laboratories are likely to have current

accreditation. Therefore, RPMs will need to plan for the additional time and expense to obtain definitive validated data using a mobile laboratory. The Defense Environmental Network Information Exchange ([DENIX website](#)) can be helpful with searching for mobile laboratories that are DoD ELAP accredited.

### 8.2.5 Data Validation of Laboratory Data

Data validation involves review and critique of the analytical procedures used to generate definitive data and generally is not applied to screening data. This includes the calibration of the analytical instrument(s), QC samples analyzed with the field sample, the calculation of the results, and many other checks. It is recommended that a minimum of 10% of analytical data be validated at Stage IV (full validation). Data sets for risk assessment and site closure should be validated at 10% Stage IV and 90% Stage III ( cursory validation). Some FECs require a higher percentage of Stage IV validation for NPL sites (e.g., NAVFAC Southwest requires 20% Stage IV for NPL sites based on EPA Region 9 guidelines). Guidance on data validation is available from the following sources:

- [DoD Quality Systems Manual \(QSM\)](#) : Appendix A of the DoD QSM presents guidance on data validation reporting requirements. The information is applicable to Contract Laboratory Program (CLP) and non-CLP methods.
- [EPA National Functional Guidelines for Superfund \(Organic, Inorganic\) Methods Data Review](#): CLP is a national network of EPA personnel, commercial laboratories, and support contractors with a mission of providing analytical data of known and documented quality. However, the guidelines can be applied to analytical methods other than those identified as CLP. It is noted that non-CLP methods may not specify the same QC and documentation requirements that CLP does; therefore, the functional guidelines cannot be followed explicitly. Software packages are available through EPA or a third party data validation company to conduct portions of the data validation process electronically.

## 8.3 Remedial Investigation

The process flow for the RI phase is shown in

Figure 8-2. The RI is performed to:

- Characterize site conditions and determine the nature and extent of contamination from historical site releases;
- Evaluate potential current and future risks to human health and the environment based on exposure to historic site releases;
- Provide a basis to distinguish between the need for further evaluation, response action, or NFA; and
- Obtain data for the evaluation of remedial alternatives if the site poses an unacceptable risk.

### 8.3.1 Site Characterization

The SAP is implemented during Site Characterization. Field data are obtained and analyzed to refine the CSM, to assess potential risk exposure to the site could pose to human health or the environment, and to support design of potential response actions (if warranted). Field data analyses and interpretation should be based on the DQOs/PQOs and QA/QC requirements outlined in the SAP.

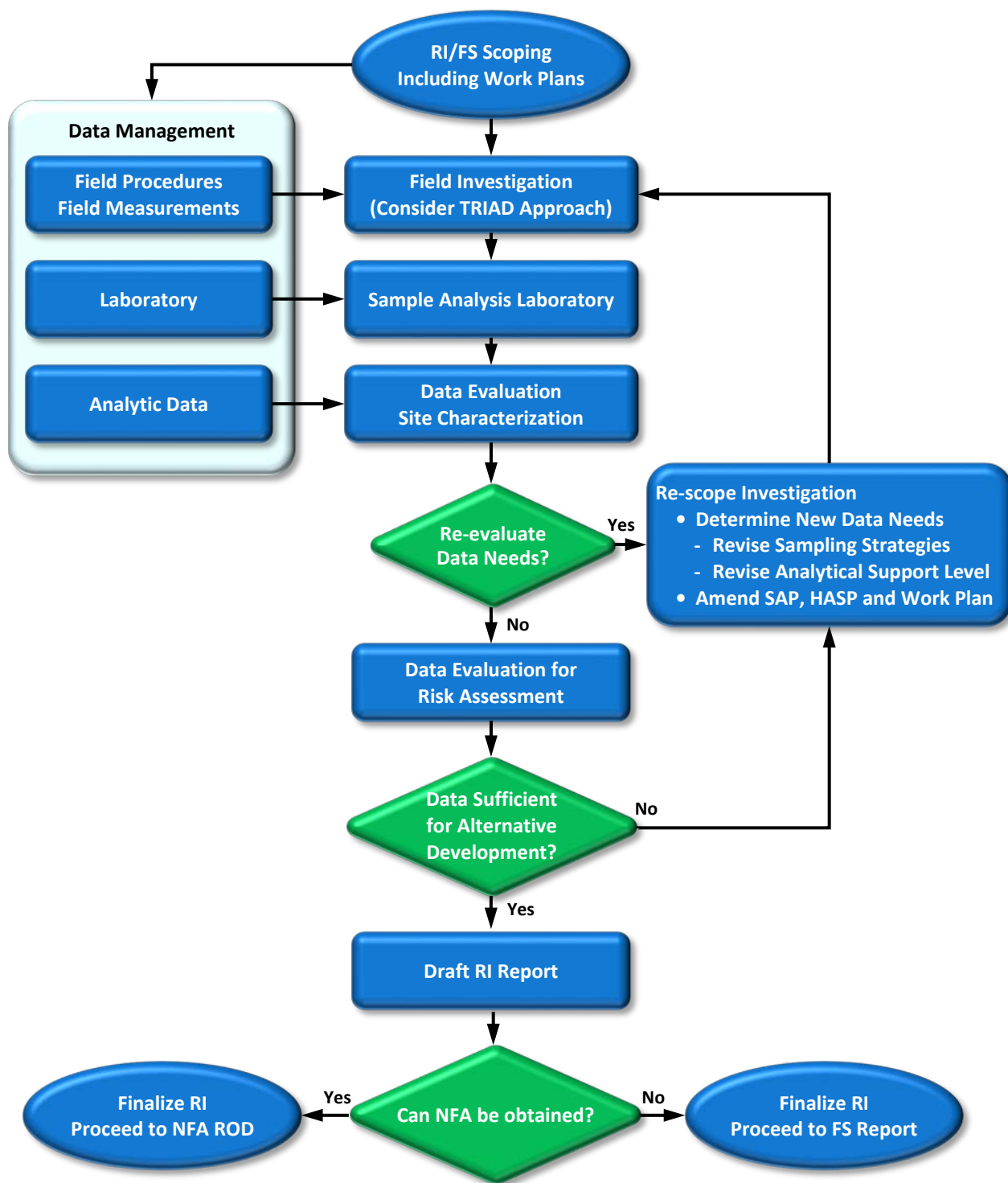


Figure 8-2 Remedial Investigation Process



The development and implementation of a successful remedial strategy is directly related to the quality of site characterization information. Data should be carefully gathered pertaining to the nature of the contaminants, mass distribution and volume estimation of each contaminant phase, and the geologic, hydrogeologic, biological, and abiotic processes affecting the disposition of contaminants.

High resolution site characterization (HRSC) is an emerging method for refining the CSM. HRSC refers to a strategy to match the sample density obtained to the data resolution needed to effectively support decision making. The use of HRSC is most advantageous when active remediation is required. It has been found that for most sites, the majority of contaminant mass tends to be located in relatively small parts of the site and is often located only within certain geological zones. Understanding this distribution can reduce implementation cost, focusing treatment in smaller areas that contain the most contaminant mass. Other advantages to HRSC and implementation methods can be found at the EPA CLU-IN Website under [Characterization and Monitoring](#).

The major steps in site characterization typically include:

- Take field observations and measurements of the physical nature of the site, including topography, surface and groundwater hydrology, meteorology, lithology, ecology, land use, building characteristics, and infrastructure. This information will be used to refine the CSM and evaluate contaminant fate and transport. Additional examples of site parameters that may be measured include:
  - Hydrogeologic parameters obtained from field tests such as a pump test or slug test;
  - Field measurements of matrix parameters including temperature, pH, conductivity, redox potential, color, and presence of nonaqueous-phase liquid;
  - Soil classification; and
  - Sediment depth and stability measurements;
- Refine the CSM generated during the PA/SI;
- Conduct field sampling in accordance with the specifications identified in the SAP/Work Plan;
- Perform sample analysis in a laboratory or using field screening techniques;
- Use data management and visualization tools to aid in the evaluation of laboratory results and field observations to characterize the site; and
- Validate data to determine the adequacy of data for deciding whether the site poses an unacceptable risk and for the development and evaluation of remedial alternatives.

The results of field observations or laboratory analyses may show that site conditions are significantly different from what was anticipated during initial scoping efforts. Re-scoping and additional sampling may be necessary (e.g., in the case of a high concentration of contaminant on the boundary area of the study, step-out sampling may be required to delineate the boundary of the contaminant mass).

Results may also indicate that the threat is more immediate than previously understood, in which case an interim removal action may be initiated. If one portion of the site needs more immediate attention than another, separating the site into OUs will facilitate addressing the highest priority area first.

#### **8.3.1.1 Sample Collection**

A critical element of site characterization is the collection of discrete samples from various media. Samples may be analyzed either in the field, using instruments, test kits, or visual observation, or in a



laboratory by any number of analytical techniques. When collecting samples it is crucial that the samples are:

- Representative of typical conditions of the location and media of interest;
- Collected in a manner consistent with the end use of the data (e.g., nature and extent, risk assessment, treatability, etc.); and
- Collected using the appropriate protocols for the media sampled and the parameters to be analyzed.

The SAP, which includes the FSP and QAPP, is a tool to accomplish these sampling objectives.

Another approach to consider while developing a SAP is the use of incremental sampling. Incremental sampling is a structured sampling protocol that reduces data variability and increases sample representativeness. The objective of incremental sampling is to obtain a single sample for analysis that has an analyte concentration representative of the decision unit. Since a single sample is collected to represent an area, project planning is crucial to ensure the data are appropriate for their intended use. Properly conducted incremental sampling can improve the reliability and defensibility of sampling data by reducing variability when compared to conventional discrete sampling strategies.

Fewer nondetect sample results can be expected using incremental sampling, thus mitigating problems caused by using censored datasets and lessening the chance of missing significant contamination. In addition, levels of statistical confidence and decision uncertainty that would require a large number of discrete analyses can often be obtained with a few incremental samples.

In any natural geologic formation, there is a degree of heterogeneity; thus, one sample is not expected to be representative of a larger area of the site. Contaminant concentrations as well as natural properties of the media can vary spatially and with depth, sometimes in an unpredictable manner. Therefore, it is necessary to obtain a sufficient number of samples to gain enough confidence that the sample set as a whole provides a reasonably accurate characterization of the site. In general, the number of samples required to meet the project objectives depends on the extent of contamination as well as the degree of variability. Thus, the factors determining the number of samples required can only be determined through sampling and analysis. The SAP is developed before these data are available; therefore, uncertainty will exist regarding the number and locations at which samples should be collected.

To manage the uncertainty discussed above, the SAP should include systematic planning to allow it to be dynamic in nature. In addition, the use of field screening and instruments for real-time measurement can expedite the process, making site characterization more rapid and efficient.

#### **8.3.1.2 Sampling Protocols/Methods**

To obtain reliable and defensible data, it is essential that the appropriate sampling methods are followed. Sampling methods depend on the matrix being sampled, the parameters to be analyzed, the physical characteristics of the sample location (e.g., sample depth), and the regulatory requirements applicable to the site.

Individual states and EPA Regions may have certain requirements that must be followed. The RPM shall ensure that the sampling protocols meet all applicable requirements. Some common sampling issues to be considered include:

- Obtaining spatial information regarding sample location (x, y, and z), and the datum or benchmarks used;
- Determining the type and number of QA/QC and confirmation samples required;

- Recordkeeping (i.e., field measurements, sample location, date, time, personnel collecting the sample, and field conditions);
- Tracking when sampling equipment is both used and calibrated;
- Decontaminating the sampling equipment; and
- Handling the samples, including preservation, field preparation (e.g., compositing, filtering) storage, shipping, and custody of samples.

RPMs should consider the use of innovative sampling methods to reduce costs, increase reliability, or that offer other advantages over conventional methods. Because new sampling methods are continually under development, RPMs should periodically identify and evaluate new methods. Information on new methods may be obtained from the [NAVFAC ERB website](#); from NAVFAC EXWC, LANT, or PAC SMEs; or through discussions with regulators and contract support.

#### **8.3.1.3 Field Screening Methods and Investigative Techniques**

RPMs should consider the use of qualitative or semi-quantitative screening methods and innovative in situ approaches to reduce the collection of expensive samples to characterize a DON ERP site. Field screening methods can be used to quickly and effectively evaluate the potential presence of contamination or features of concern at a site and target specific areas for further investigation. A description of various field screening techniques that can be used for characterization of explosives, sediment, metals, radionuclides, and volatile organic compound (VOCs) are provided on the [NAVFAC ERB website](#).

The successful remediation of a site depends on properly identifying the vertical and horizontal extent of contamination and quantifying the mass distribution of each contaminant phase. Geophysical methods can be used to help define the physical and chemical properties of contaminants, the distribution of contaminants, and the subsurface hydrogeology and geology of a site. In situ and ex situ technologies are available to allow for the evaluation of the presence of petroleum hydrocarbons and/or other organic hydrocarbons (e.g., solvents). In situ techniques which allow a rapid determination of subsurface contaminant distribution by measuring secondary characteristics (e.g., conductivity differences) also are available.

It is generally advisable that when field screening methods are used, confirmatory samples also should be analyzed at an off-site laboratory as an independent check on the function and accuracy of these tools. Field analytical methods and in situ screening tools can be used to determine vertical and horizontal extent of contamination. However, it is advisable to perform confirmation sampling within and at the boundaries of an identified contamination area/zone using fixed laboratory analytical work. The frequency of confirmation sampling should be agreed upon with the appropriate regulatory agency, documented in the SAP, and should also be flexible based on consistency of previous results and other factors related to QA/QC.

#### **8.3.1.4 Geostatistical Methods**

Geostatistical methods are an effective means to manage site uncertainties. Geostatistics and related computer-based exploratory data analysis tools, including GIS, can be used to determine whether site contamination data are spatially correlated. If the data are not spatially correlated, classical statistical estimation methods are not appropriate. Instead, a geostatistical variogram can be developed as a model of the contaminant spatial variability (correlation) and used in point kriging to estimate contaminant concentrations at unsampled locations. The results can be used to iteratively identify significant data gaps where additional samples should be collected to reduce uncertainty to acceptable levels. Geostatistics is

also a useful tool in risk assessment and in determining areas requiring remediation, particularly for soil and sediment sites. Using block kriging, geostatistics can be used to estimate the average exposure concentration of a contaminant over respective exposure units to a specified confidence level (e.g., 95% upper confidence limit). Similarly, if the exposure concentration exceeds acceptable risk levels, geostatistics can be used to define “hot spot” areas within an exposure unit that should be remediated to achieve acceptable risk levels. For additional information on the application of geostatistics to ER projects, see the CECOS training course “Environmental Geographic Information Systems”.

#### **8.3.1.5 Data Management and Visualization**

During the site characterization phase, the volume of data generated can become quite large and must be properly managed. The use of data management and visualization tools allows data to be easily retrieved, queried, tabularized, and shown graphically in many different formats. The data management and visualization tool used in the DON ERP is NIRIS. NIRIS is used to manage all site data and directly receives electronic data deliverables that are generated by commercial laboratories. It supports tools for data analysis and visualization, including GIS tools, a document management system, a LUC Tracker tool, various statistical tools, and modeling tools. Further detail about NIRIS is provided in Section 15.7.3.

The use of these tools allows DON personnel and stakeholders to develop a better understanding of site characteristics during any phase of the ER process, not just RI/FS. This results in better decisions and a more effective and efficient response action.

#### **8.3.1.6 Investigation-Derived Waste Management**

RI field activities, or any ER activities after the PA, may result in the generation of waste materials that are regulated under RCRA or other laws and regulations and may pose a risk to human health and the environment. Common investigation-derived waste (IDW) includes drill cuttings from soil borings or monitoring well installation and purge water from monitoring well development and sampling. IDW management shall ensure protection of human health and the environment and be in compliance with appropriate laws and regulations. EPA and state policy should be incorporated into the IDW Management Plan developed for each site investigation or RA. The state and EPA should review this plan as part of the work plan review.

In certain situations, IDW can be left on-site, which is typically more cost-effective and in many cases results in lower overall risk than transportation and off-site disposal. EPA [Guide to Management of Investigation-Derived Wastes](#) (OSWER 9345.3-03FS) presents an overview of possible IDW management options, explains the protectiveness requirements associated with these options, and outlines general objectives established for IDW management under Superfund.

#### **8.3.1.7 Health and Safety Requirements**

All activities at an ER site shall be completed in accordance with applicable and relevant DON health and safety procedures and requirements, which are compliant with federal regulations and other DoD guidance. All personnel engaged in RI/FS activities shall be properly trained in accordance with DON health and safety training requirements, and shall be compliant with all medical surveillance required by DON. Personnel involved in DON ERP activities shall be trained to a degree consistent with their involvement in ER project work. More details on Health and Safety Requirements are provided in Chapter 17.

### **8.3.2 Background Concentrations**

An important step in the RI is the determination of background concentrations for chemicals that may be of potential concern. Both natural processes (e.g., erosion of naturally-occurring metallic mineral

deposits) and anthropogenic processes (e.g., deposition of lead from internal combustion engine exhaust) may result in the presence of various chemicals, including hazardous substances. These background chemicals are derived from sources not related to site-specific DON activities or operations, and should not be considered DON releases. Failure to distinguish between DON releases and background conditions may lead to unnecessary remediation and delay property transfer and reuse.

Direction on the evaluation of background chemical levels for DON ERP sites is provided in the [Navy Policy on the Use of Background Chemical Levels](#). According to the policy, cleanup efforts at DON sites should address only those risks associated with chemical concentrations that are elevated as a result of a site-related release, and cleanup goals should not be set lower than background levels.

*Cleanup efforts should address only chemical concentrations that result from a site-related release*

Various methods are available for performing background analyses at a site. It is best to obtain concurrence from all stakeholders, especially the local regulatory agency, regarding which method to use prior to performing the sampling and analysis. EPA's ProUCL software provides several methods for comparing site data to background datasets. Additionally, NAVFAC has published a four-volume set of guidance documents to provide instructions for identifying background chemicals and estimating background concentration ranges at sites where past uses of the property have resulted in actual or suspected chemical releases impacting soil, sediment, groundwater or indoor air:

- [Guidance for Environmental Background Analysis Volume I: Soil](#) (UG-2049-ENV);
- [Guidance for Environmental Background Analysis Volume II: Sediment](#) (UG-2054-ENV);
- [Guidance for Environmental Background Analysis Volume III: Groundwater](#) (UG-2059-ENV); and
- [Guidance for Environmental Background Analysis Volume IV: Vapor Intrusion Pathway](#) (UG-2091-ENV).

These four volumes provide step-by-step instructions for the background analysis techniques appropriate for the particular medium (soil, sediment, groundwater or indoor air). Volumes I through III include methods such as exploratory data analysis, the geochemical method, and the comparative method. These approaches are briefly summarized below. The methods described in Volume IV, VI Pathway, vary from the other volumes because VI investigations often lack the large datasets that are characteristic of other media. In addition, site-specific air concentrations usually display high variation. The combination of small datasets and highly variable concentrations limits the applicability of classical statistical comparative methods, which require large, randomly-collected datasets. Consistent with the [Navy/Marine Corps Policy on Vapor Intrusion](#) and the [DoD Vapor Intrusion Handbook](#), RPMs should assess multiple lines of evidence based on a "weight of evidence" approach to determine whether the detected contaminants in indoor air samples can be attributed to background sources or known site subsurface releases.

**Exploratory Data Analysis** is a statistical and graphical procedure for examining data to describe the distributional features of the background data. It is the first step prior to selecting a method of background analysis for all media. This method uses graphical techniques (histograms, boxplots, and probability plots); descriptive statistics; and geological, geochemical and hydrological properties to characterize and evaluate the background dataset.

**The Geochemical Method** can be applied for soil and sediment. This method uses techniques based on geochemical principles to distinguish between data representing the background population and data representing soil or sediment contamination. Chemical concentrations in natural soil and sediment are controlled by the chemical composition of the parent rocks and geochemical processes (e.g., weathering)

that occur during soil and sediment formation; therefore, concentration ratios of certain metals are often correlated. Depending upon the regional geology and availability of a background dataset, the geochemical method can be completed using a background dataset, or using only data from the potentially-impacted site.

**The Comparative Method** can be used for soil, sediment, or groundwater. This method evaluates background by determining whether differences between the site and background datasets are statistically significant. The comparative method requires the establishment of a background dataset for the media of concern (soil, sediment, or groundwater) that is representative of a non-impacted reference area which is physically and geochemically similar to the potentially-impacted area (for example, soil in both areas should be derived from similar parent rocks and formed in similar environments).

Ideally, background concentrations are expressed as ranges to account for sampling and analysis variability. Concentrations of background chemicals should be evaluated as early as possible (but at a minimum in the RI) in the CERCLA process, to differentiate between DON cleanup responsibilities and background sources.

### 8.3.3 Risk Assessment

As part of the RI/FS process, the NCP requires that the nature and extent of site risks to human health and the environment be characterized through risk assessments. Risk assessments are performed to evaluate the potential threat to human health and the environment in the absence of any RA under current and likely future conditions. The results of the HHRA and ERAs are used to make site-specific risk management decisions regarding the need for a RA.

#### *Useful Links to Related Topics*

[Emerging Contaminants](#)

[Vapor Intrusion Pathway](#)

[Contaminated Sediments](#)

In addition, DON [Policy on Natural Resource Injury and Damages in the Installation Restoration Program](#) states that the ERA

process will assess NRI if there are natural resources potentially impacted by DON hazardous substance releases. There may be some cases where NRI is addressed in the HHRA such as when drinking water standards are exceeded. However, DON policy prohibits the use of ER,N/BRAC funds to conduct natural resource damage assessments (NRDAs) or to determine damages to natural resources. Therefore, assessments produced with ER,N/BRAC funding shall not include information regarding monetary or economic losses attributed to NRI. More detailed information on how to integrate NRI into the ERP and how to address NRDAs is shown in Section 14.10.

DON has defined a tiered approach that follows EPA guidance for both the HHRA and the ERA processes. Tier 1 is a conservative SRA to identify any COPCs that may need to be evaluated further, or recommend a site for NFA if appropriate. Tier 2 is a more rigorous site-specific baseline risk assessment that provides a detailed characterization of risks posed by the site and identifies the risk drivers, or COCs. Tier 3 is an evaluation of remedial alternatives with regards to effective risk reduction, potential impacts from remedy implementation and evaluation of residual risks. Tier 3 is only conducted if the results of Tier 2 are unacceptable risks requiring remedy evaluation.

The goal of the DON tiered approach is to incorporate risk management into the decision-making process, eliminate sites that are of no concern, and ensure that the level of effort expended to evaluate sites is commensurate with the magnitude and complexity of the site-specific issues. The DON approach emphasizes frequent interactions and concurrence among the DON project team to ensure that the risk assessments are scientifically-based, defensible, and cost-effective.

To incorporate risk management into the decision-making process for the site, it needs to be considered throughout the risk assessment process. The RPM needs to ensure appropriate data are collected throughout the process so that a scientifically defensible decision can be made. The RPM needs to consider other aspects of the DON ERP including costs, schedules, and stakeholder concerns, throughout the implementation of the risk assessments as these may impact final decisions at the site.

Prior to conducting a risk assessment, it is important that the approach for the risk assessment, particularly the risk assessment design and input factors (such as methodology/protocol, toxicity criteria, exposure factors, and receptors), is planned and documented either within the RI Work Plan, SAP, or other document submitted to the appropriate regulatory agencies. The proposed approach for the risk assessment should be presented to the regulators early in the process, and concurrence on this approach should be obtained before the risk assessment is initiated. Obtaining regulatory agreement upfront generally will ensure that the data collected will support risk assessment requirements. This is an important step, as in certain cases risk assessment approaches may vary based on differences in state and EPA regional guidance and policies (for example, selecting COPCs, evaluating background risk, and selecting toxicity criteria).

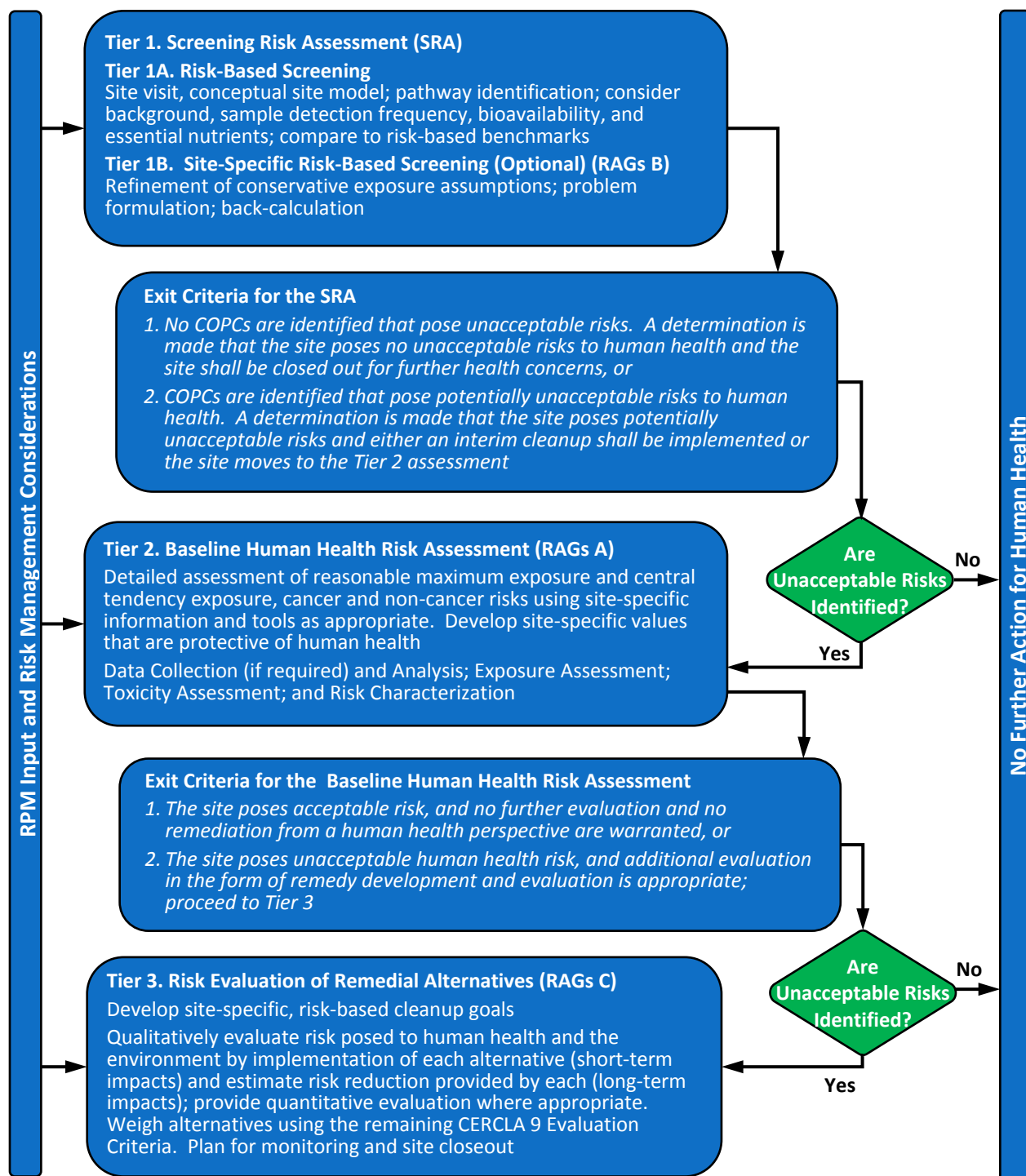
#### **8.3.3.1 Human Health Risk Assessment**

The approach for conducting HHRAs at DON ERP sites is defined in the [Navy Policy for Conducting Human Health Risk Assessments under the Environmental Restoration Program](#) (CNO Ser N453E/10595168). This policy specifies the implementation of a three-tiered risk assessment approach during the RI/FS process as outlined in Figure 8-3. The DON approach closely mirrors the [EPA Risk Assessment Guidance for Superfund \(RAGS\)](#) process. [Navy Human Health Risk Assessment Guidance](#) provides details on what should be included and considered in each tier of an HHRA, discussion on technical issues, and description of tools available to assist in the completion of HHRAs. Risk assessors from the NMCPHC and members of the Risk Assessment Workgroup are available to provide technical reviews of HHRA documents.

##### **8.3.3.1.1 Tier 1 Screening Risk Assessment**

A Tier 1 SRA is conducted to identify COPCs that may pose unacceptable risks to human health, thus focusing efforts and funds on those constituents most likely to drive human health risks. More details on the SRA process can be found in the NAVFAC BMS.

The SRA is generally performed during the SI phase but in some cases is done during the RI. Important components of the Tier 1 SRA include a site visit, development or revision of the CSM, identification of complete exposure pathways, and problem formulation using the DQO/PQO process. In most cases, the Tier 1 SRA is performed using existing data from the SI. The Tier 1 SRA can consist of two parts: Tier 1A, Risk-Based Screening, which is required, and Tier 1B, Site-Specific Risk-Based Evaluation, which is optional. Tier 1A must be completed before continuing the HHRA process.



**Figure 8-3 DON Human Health Risk Assessment Tiered Approach**

Tier 1A, Risk-Based Screening, is conducted by comparing the maximum concentration of each chemical detected with a completed pathway in each environmental medium (e.g., soil, surface water, groundwater, indoor air, etc.) to the appropriate risk-based concentration benchmark. Chemical constituents having maximum detected concentrations that are below their benchmark or screening values are eliminated from further consideration in the HHRA process, whereas chemicals exceeding the screening levels are retained for further evaluation. The screening benchmarks selected for use in Tier 1A



are agreed upon with the appropriate regulators. At Tier 1A, the screening levels are often based on default, conservative exposure scenarios (e.g., residential land use).

Tier 1A is also used to evaluate each chemical constituent with regards to its background levels, detection frequency, bioavailability, and role as a nutrient. Tier 1A should result in a list of chemicals that will be eliminated from further consideration and a list of COPCs to be evaluated further in either Tier 1B or Tier 2. Chemicals consistent with background levels are not evaluated quantitatively in Tier 2, consistent with the [Navy Policy on the Use of Background Chemical Levels](#). Only chemicals attributable to a release from the site are carried through for Tier 2 evaluation. If no COPCs are identified, the site proceeds to the Tier 1 exit criteria, and an NFA decision is recommended for the HHRA.

Tier 1B, the Site-Specific Risk-Based Evaluation, may be initiated for any chemical that is retained following Tier 1A evaluation. Tier 1B further evaluates the COPCs by refining the conservative, default assumptions used in Tier 1A. The risk evaluation may use the screening levels employed in Tier 1A or site-specific screening levels that have been calculated for the site-specific exposure scenarios. Unlike Tier 1A, Tier 1B is optional and does not need to be performed at all sites. For further guidance about which sites may benefit from a Tier 1B screen, refer to the Navy Human Health Risk Assessment Guidance. Tier 1B will have one of two outcomes: (1) exposure to COPCs will pose no unacceptable risk to human health, or (2) exposure to some COPCs potentially pose an unacceptable risk to human health. If COPCs are found to pose potentially unacceptable risks to human health, either an interim removal or RA is implemented or the HHRA moves to Tier 2, the baseline human health risk assessment (BHHRA).

#### **8.3.3.1.2 Tier 2 Baseline Human Health Risk Assessment**

The purpose of a BHHRA is to determine if exposure to a site poses potentially unacceptable risk based on current or future land use and current (i.e., baseline) site conditions if no remedial actions or LUCs are applied at the site. BHHRA also provide a basis for determining levels of chemicals that can remain on-site and still be adequately protective of human health. The Tier 2 BHHRA is intended to be a more rigorous, site-specific evaluation than the Tier 1 SRA and is to be conducted during the RI phase. Rather than relying solely on conservative default assumptions and comparison of maximum detected concentrations to risk-based screening levels, Tier 2 incorporates site-specific information to calculate risk estimates. Based on the [Navy Policy on the Use of Background Chemical Levels](#), chemicals that are within background levels will not be quantitatively evaluated in Tier 2. These chemicals will be compared to screening benchmarks and will be discussed in the risk characterization section of the risk assessment but will not be included in the quantitative site-related risk. More details on the BHHRA process can be found in the NAVFAC BMS.

A key aspect of the BHHRA is the study design. The CSM and DQOs/PQOs developed in Tier 1 need to be re-evaluated to ensure the appropriate data are collected to permit risk characterization and support risk-based decision making for the site. During study design, extensive communication among DON, regulators, and stakeholders is needed to ensure agreement on all key issues including current and future land use scenarios, data collection and analytical methods, exposure scenarios, exposure concentrations, and the statistical analysis to be used in the risk estimation. It is critical that the RPM fully understand the basis for all aspects of the BHHRA study design proposed by contractors or regulators and how the study results will be used to support the risk management decisions. All agreements should be documented in meeting minutes and the final RI Work Plan. These include agreements on specific requirements needed to proceed as well as those requirements that all have agreed are unnecessary. If agreements are not obtained, the RPM should document the positions and elevate the matter to upper management for resolution before proceeding in the process.



The BHHRA process can be divided into four components: (1) data collection and evaluation, (2) exposure assessment, (3) toxicity assessment, and (4) risk characterization.

**Data Collection and Evaluation:** The purpose of the data evaluation and reduction process is to ensure the data are appropriate for use in a BHHRA and to identify COPCs. This process entails a variety of different analytical steps that result in a useable data set for evaluating exposures at a site. The level of effort and need for each step depends on the quantity of the data, the complexity of the site, and analytical results. A site-specific data analysis should include consideration of DQOs/PQOs, site characterization, data quality, background conditions, and risk-based screening to identify potential COPCs.

**Exposure Assessment:** The goal of the exposure assessment is to quantify the exposure to COPCs for complete exposure pathways. Exposure assessment consists of:

- Identifying the source of the environmental contamination and the media that transports the contaminant;
- Determining the contaminant concentration;
- Identifying the potentially exposed population;
- Determining the exposure scenarios, pathways, and routes of exposure; and
- Determining the exposure factors related to human behaviors that define time, frequency, and duration of exposure.

The selection of receptors and thus exposure factors is part of the risk assessment study design. Because much uncertainty and variability is inherent in the site-specific exposure assessment, the exposure point concentration is assessed carefully to estimate the potential exposure to COPCs. Exposure point concentrations should be developed for the reasonable maximum exposure (RME) and the central tendency exposure (CTE) scenarios. In general, CTE estimates are created by replacing the exposure factors and, in some cases, the exposure point concentrations used in the RME scenario, with average or median values. EPA recommends that the RME be based on a plausible upper-bound estimate of exposure rather than the worst-case exposure scenario. The CTE exposure estimate should be either the arithmetic mean exposure (average estimate) or the median exposure (median estimate). Both of these exposure estimates can help bound the potential exposure and therefore be helpful when informing site management decisions.

The fundamental components of the exposure assessment are updating and using the CSM, incorporating land use analyses to define receptors, defining the exposure area, and calculating the exposure point concentration.

**Toxicity Assessment:** The objective of the toxicity assessment is to identify and use dose-response information to estimate potential health effects from exposure to site COPCs. The quantification of dose and human response necessary to estimate both carcinogenic risk and non-carcinogenic hazard has been conducted for many chemicals and is compiled in resources such as the EPA [Integrated Risk Information System \(IRIS\)](#). A compiled summary of EPA-vetted toxicity values is available on EPA's [Regional Screening Level \(RSL\) Table](#). Since toxicity values may be updated more frequently than the RSL table, it is always important to ensure the most current dose-response information is used in the BHHRA.

**Risk Characterization:** The risk characterization step combines data analysis, exposure analysis, and toxicity assessment to estimate potential risk from exposure to site COPCs. The objective is to characterize the potential or actual carcinogenic risk and non-carcinogenic hazards identified from the integrated information developed during the exposure and toxicity assessments. Risk characterization serves as a

key step in the decision-making process and as the bridge between risk assessment and risk management. The risk characterization should include a thorough discussion of the uncertainties in the quantitative risk estimates and how this uncertainty impacts the calculated risk assessment results in order for regulators, stakeholders, and risk managers to put the risk estimates in proper context. If the results of the BHHRA indicate that the site does not pose an actual or potential risk to human health, then an NFA decision for human health can be recommended. The RI must still include an ERA, unless the site already has a ROD/DD in place without an ERA. Only if both the HHRA and ERA indicate that the site does not pose an unacceptable risk can the RI recommend NFA, which would then be documented in a ROD/DD. If further action is required, a Tier 3 risk evaluation of remedial alternatives would be necessary. If a Tier 3 evaluation for ERA is also required, it would be performed together with the Tier 3 evaluation for HHRA. The Tier 3 risk evaluation of remedial alternatives is discussed in Section 8.3.3.3.

#### **8.3.3.2 Ecological Risk Assessment**

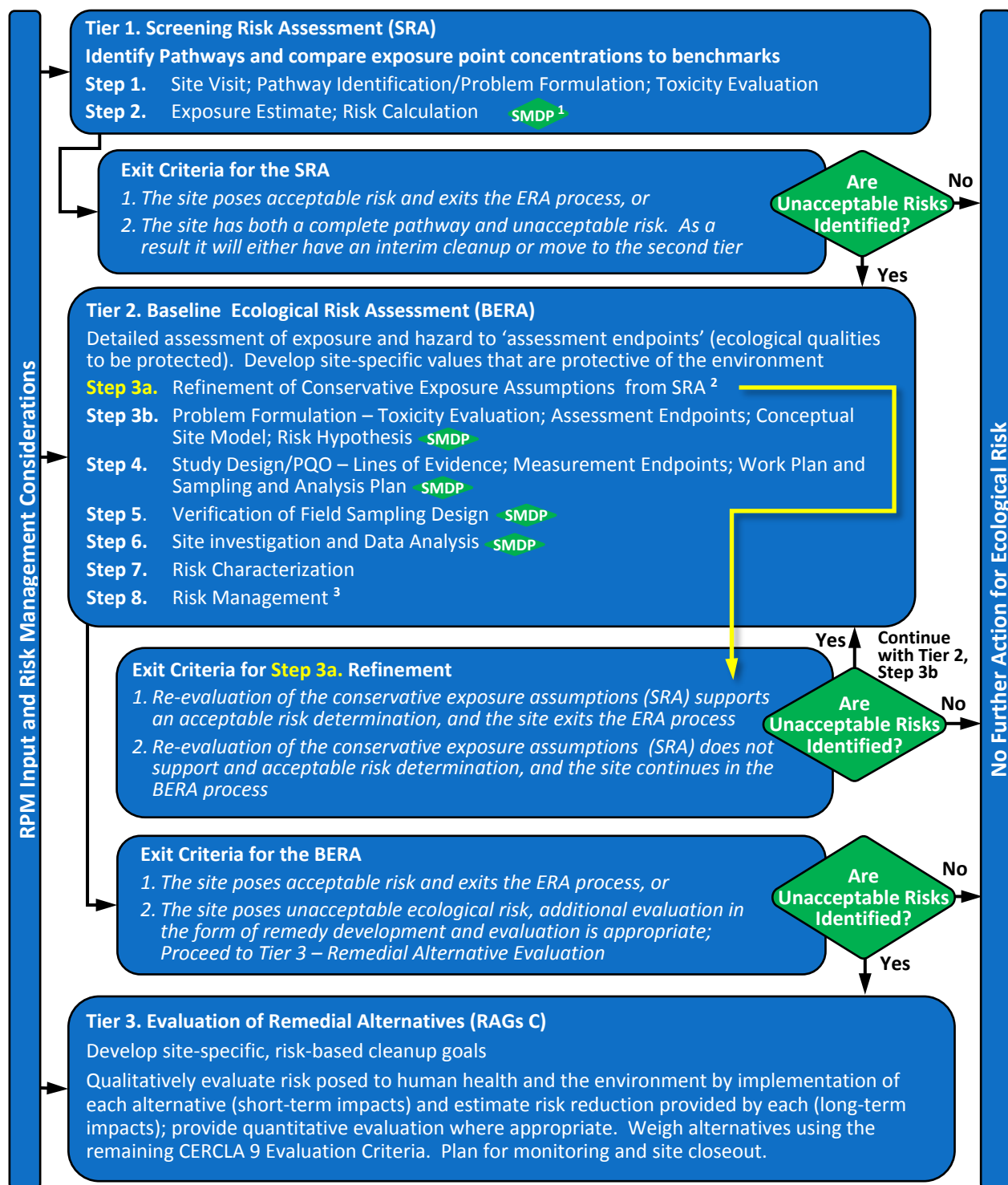
An ERA evaluates the likelihood that an adverse ecological effect has occurred or may occur as a result of exposure to one or more stressors. Those stressors, as defined by EPA, are physical, chemical, or biological entities that can induce an adverse ecological response (such as toxicity, bioaccumulation, death, or reproduction impairment). Under the NCP (40 CFR Part 300.430), an ERA should be conducted to identify and mitigate adverse environmental impacts, as well as to select RAs that tend to protect organisms, populations, communities, and ecosystems. Adverse responses can range from effects on populations of an organism to the loss of an ecosystem's function.

The DON approach for conducting ERAs is defined in the [Navy Policy for Conducting Ecological Risk Assessments](#) (Ser N453E/9U595355) and specifies that a three-tiered risk assessment approach be implemented as outlined in Figure 8-4. This approach mirrors EPA's eight-step process defined in the [Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments](#) (OSWER 9285.7-25). DON ERA guidance, along with ERA-related issue papers, are located on the [NAVFAC ERB website](#) under Risk Assessment. Members of the Risk Assessment Workgroup are available to provide technical reviews of ERA documents.

##### **8.3.3.2.1 Tier 1: Screening Risk Assessment**

The ERA Tier 1 SRA is conducted to identify COPCs that may pose unacceptable risks to the environment, thus focusing efforts and funds on those constituents most likely to drive ecological risks. The Tier 1 SRA consists of two steps. Important components of Step 1 include elements of problem formulation such as conducting a site visit, identifying site-specific data needs (e.g., site chemical data, ecotoxicity, data for suspected COPCs), identification of assessment/measurement endpoints and representative receptors (surrogate species will be selected to represent threatened or endangered species), determination of complete exposure pathways, and refinement of the CSM. Important components of Step 2 include calculating an exposure point concentration based on the CSM developed in Step 1 and characterizing risk through the use of hazard quotients.

Chemicals consistent with background levels will not be carried forward to the BERA, consistent with Navy Policy on the Use of Background Chemical Levels. These chemicals will be compared to the screening benchmarks and will be presented in the risk characterization section of the BERA, rather than included with the site-related risk.



<sup>1</sup> See EPA's 8 Step ERA Process for requirements for each Scientific Management Decision Point (SMDP)

<sup>2</sup> Refinement includes but is not limited to background, bioavailability, detection frequency, etc.

<sup>3</sup> Risk Management is incorporated throughout the tiered approach

**Figure 8-4 DON Ecological Risk Assessment Tiered Approach**

The SRA is usually conducted during the SI phase using existing data and conservative assumptions; although in some cases it is performed during the RI phase. For each receptor/COPC combination having a complete exposure pathway, the maximum concentration detected is compared to the appropriate ecotoxicity benchmark using the hazard quotient approach, and chemical constituents having maximum concentrations that are below their benchmark values are eliminated from further consideration. Examples of benchmarks include the EPA [National Recommended Water Quality Criteria - Aquatic Life Criteria Table](#) and EPA [Ecological Soil Screening Level Guidance and Documents](#). Also, the [Risk Assessment Information System](#) web page maintains a database of ecological benchmarks for various types of biota and various environmental media.

It is important to include regulators and stakeholders in the identification of the appropriate assessment endpoints and ecotoxicity benchmarks and all agreements should be documented. If there are natural resources potentially impacted by releases at a site, then the designated natural resource trustees should be included during the ERA process to the extent practicable. Although trustee involvement is encouraged in the DON ERP, only DON, as lead agency, and appropriate parties (i.e., regulators) make the final decisions regarding cleanup and investigations. More details on the ecological SRA process can be found in the NAVFAC BMS.

At the conclusion of Tier 1, the SRA will characterize the ecological risk posed by the site, which then is used to make one of the following two risk management decisions:

1. The SRA demonstrates that there are no unacceptable ecological risks or demonstrates an absence of complete exposure pathways to all ecological receptors. Under these conditions, the site may be closed out for ecological concerns and exit the ERA process; or
2. The SRA demonstrates that potential exposure pathways and unacceptable risk may exist. Under these conditions, either an interim action can be taken or the Tier 2 BERA is initiated.

#### **8.3.3.2.2 Tier 2 Baseline Ecological Risk Assessment**

The Tier 2 BERA is intended to be a more rigorous evaluation than the Tier 1 SRA and is conducted during the RI phase. Rather than relying on conservative assumptions and comparison to ecotoxicity benchmarks, Tier 2 incorporates site-specific information to calculate risk estimates. More details on the BERA process can be found in the NAVFAC BMS.

The first component of the Tier 2 BERA is Step 3a. The goal of this step is to refine the conservative exposure assumptions used in the Tier 1 SRA and recalculate the risk estimates. This re-evaluation includes considerations of background chemical concentrations, sample detection frequency, bioavailability, and more site-specific exposure scenarios. It is important to obtain regulatory concurrence on all refinements made in Step 3a.

If, at the end of Step 3a, the re-evaluation of the conservative exposure assumptions supports an acceptable risk determination, then the results are documented and the site exits the ERA process. If re-evaluation of the assumptions still indicates an unacceptable risk, the process continues with the Tier 2 BERA problem formulation for those COPCs that did not get removed from the list during the Step 3a evaluation.

The BERA consists of:

- Problem formulation;
- Study design and DQOs/PQOs;
- Verification of the field sampling design;

- Site investigation and analysis; and
- Risk characterization.

These activities involve extensive communication between DON, regulators, natural resource trustees, and other stakeholders. It is critical that the RPM fully understand the basis for all aspects of the BERA study design proposed by contractors or regulators and how the study results will be used to support the risk management decisions. Concurrence from regulators should be received throughout the BERA process on assessment endpoints, measurement endpoints, risk questions, application and results of the DQO/PQO process, and specific study designs. It is important that all agreements and decisions be documented throughout the BERA process to support final risk management decisions. These include agreements on specific requirements needed to proceed as well as those requirements that all have agreed are unnecessary. If agreements are not obtained, the RPM should document the positions and elevate the matter to the ER Manager for resolution before proceeding to the next step. It is important to note that multiple iterations of the BERA are not warranted.

The completed study design is documented in a work plan and SAP in accordance with the [Uniform Federal Policy for Quality Assurance Project Plans Manual](#) requirements. It is important to verify the sampling design (prior to project implementation) through simple pilot studies to ensure that the requisite data can be collected using the methods identified in the work plan and SAP (e.g., there are sufficient fish of the required size available to collect the mass needed to run fish tissue samples, designated sampling locations are accessible, etc.). If work plan or SAP implementation issues are identified, the RPM is responsible for resolving the issues, and revising the work plan and SAP prior to project initiation/mobilization.

The data analyses and results are documented in the BERA, which is ultimately referenced in the final RI Report. For each assessment endpoint, the risk is characterized through a risk calculation using the methods identified during the study design and documented in the SAP. A discussion and summary of the uncertainties associated with the calculated risk are included as part of the risk calculation. In addition to the risk estimation, a risk description is provided, which helps interpret the risk results and identifies a threshold for adverse effects for each endpoint.

At the conclusion of Tier 2, the BERA will characterize the ecological risk posed by the site, which then is used to make one of the following two risk management decisions:

1. No further evaluation and no remediation from an ecological perspective is warranted because the site does not pose unacceptable risk; or
2. The site poses unacceptable ecological risks, and remedial alternative development and evaluation (Tier 3) is appropriate.

#### **8.3.3.3 Tier 3 Risk Evaluation of Remedial Alternatives**

Guidance for both HHRAs and ERAs specifies that Tier 3 be performed as part of the analysis of alternatives in the FS. Tier 3 is the evaluation of the remedial alternatives (including no action) with regards to: (1) the effectiveness of reducing risks to acceptable levels; (2) human health and/or ecological impacts related to remedy implementation; and (3) residual risks that will remain at a site. The purpose of this risk evaluation of remedial alternatives (RERA) is to provide RPMs with a qualitative and/or quantitative assessment of the potential short-term and long-term health risks associated with the remedial alternatives. These alternatives are evaluated using the nine remedy selection criteria identified in the NCP to aid in the selection of a remedy for a site. Residual risks that exceed acceptable risk levels will require implementation of LUCs. The need for LUCs is determined by site-specific considerations and in

consultation with the regulators. More details on the HHRA and ERA Tier 3 processes can be found in the NAVFAC BMS.

#### **8.3.4 Risk Management**

Evaluating RME and CTE scenarios provides risk managers with a range of risks and becomes useful in the decision-making process. Risk management integrates the results of the risk assessment with other considerations such as economic, technical, or legal concerns to select a remediation approach that is feasible as well as protective of human health and the environment, and in some cases, will support an NFA decision. More guidance on risk management can be found in EPA [Rules of Thumb for Superfund Remedy Selection](#) (OSWER Directive 9355.0-69). 40 CFR Part 300.430 (e)(2)(i)(A)(2) states “For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between  $10^{-4}$  and  $10^{-6}$  using information on the relationship between dose and response. The  $10^{-6}$  risk level shall be used as the point of departure [criteria] for determining remediation goals for alternatives when ARARs are not available or are not sufficiently protective because of the presence of multiple contaminants at a site or multiple pathways of exposure.” EPA [Role of the Baseline Risk Assessment in Superfund Remedy Selection Decision Documents](#) (OSWER Directive 9355.0-30) provides additional guidance on interpretation of these risk levels. Generally, cumulative site risk below  $10^{-6}$  does not require RA while cumulative risk above  $10^{-4}$  usually does require action. The range between  $10^{-4}$  and  $10^{-6}$  is considered the risk management range and the need for remediation at sites falling within this range is generally a risk management decision determined by various considerations such as uncertainty or site-specific conditions. For non-carcinogens that have the same mode of action, EPA has established, for regulatory purposes, that when the total hazard index for an exposed individual or group of individuals exceeds 1, there may be concern for potential non-cancer effects (e.g., respiratory illnesses, etc.).

#### **8.3.5 Remedial Investigation Report**

The results of the site characterization are documented in an RI Report. The RI Report is provided in preliminary/internal draft for DON review, draft for full regulatory review, and final after comments have been addressed. The RI Report can be combined with the FS Report to form an RI/FS Report, but the RI and FS reports also can be submitted separately. Details regarding the RI/FS Report are presented in EPA [Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA](#) (OSWER Directive 9355.3-01). Table 8-1 contains the recommended format for the RI Report, and Table 8-5 contains the recommended format for the FS report. The RI Report presents the methods used for the RI, the updated CSM resulting from the investigation, the results of the risk assessment, a determination of whether further RA is needed, and if so, recommended RAOs.

An RA is generally warranted if one or more of the conditions below is met (see also [EPA Rules of Thumb for Superfund Remedy Selection](#) [OSWER Directive 9355.0-69] and EPA directive [Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions](#) [OSWER Directive 9355.0-30]).

- The cumulative excess carcinogenic risk to an individual exceeds  $10^{-4}$  (using RME assumptions for either the current or reasonably anticipated future land use);
- The non-carcinogenic hazard index is greater than 1 (using RME assumptions for either the current or reasonably anticipated future land use);
- Site contaminants cause adverse environmental impacts; or
- A chemical-specific ARAR is exceeded.

**Table 8-1 Recommended Remedial Investigation Report Format**

Executive Summary

1. Introduction

- 1.1. Purpose of Report
- 1.2. Site Background
  - 1.2.1. Site Description
  - 1.2.2. Site History
  - 1.2.3. Previous Investigation
- 1.3. Report Organization

2. Study Area Investigation

- 2.1. Includes field activities associated with site characterization. These may include physical and chemical monitoring of some, but not necessarily all, of the following:
  - 2.1.1. Surface Features (topographic, mapping, etc.; natural and artificial)
  - 2.1.2. Contaminant Source Investigations
  - 2.1.3. Meteorological Investigations
  - 2.1.4. Surface-Water and Sediment Investigations
  - 2.1.5. Geological Investigations
  - 2.1.6. Soil and Vadose Zone Investigations
  - 2.1.7. Groundwater Investigations
  - 2.1.8. Human Population Surveys
  - 2.1.9. Ecological Investigations
- 2.2. If technical memoranda documenting field activities were prepared, they may be summarized in this section and referenced.

3. Physical Characteristics of the Study Area

- 3.1. Includes results of field activities to determine physical characteristics. These may include some, but not necessarily all, of the following:
  - 3.1.1. Surface Features
  - 3.1.2. Meteorology
  - 3.1.3. Surface-Water Hydrology
  - 3.1.4. Geology
  - 3.1.5. Soils
  - 3.1.6. Hydrogeology
  - 3.1.7. Demography and Land Use
  - 3.1.8. Ecology

4. Nature and Extent of Contamination

- 4.1. Presents the results of site characterization, both natural chemical components and contaminants in some, but not necessarily all, of the following media:
  - 4.1.1. Sources (lagoons, sludges, tanks, etc.)
  - 4.1.2. Soils and Vadose Zone
  - 4.1.3. Groundwater
  - 4.1.4. Surface Water and Sediments
  - 4.1.5. Air

5. Contaminant Fate and Transport



**Table 8-1 Recommended Remedial Investigation Report Format (Continued)**

5.1. Possible Routes of Migration (i.e., air, groundwater, etc.)
5.2. Contaminant Persistence
5.2.1. If they are applicable (i.e., for organic contaminants) describe estimated persistence in the study area environment and physical, chemical, and/or biological factors of importance for the media of interest.
5.3. Contaminant Migration
5.3.1. Discuss factors affecting contaminant migration for the media of importance (e.g., sorption onto soils, solubility in water, movement of groundwater, etc.).
5.3.2. Discuss modeling methods and results, if applicable.
6. Risk Assessment
6.1. Human Health Evaluation
6.1.1. Data Analysis
6.1.2. Exposure Assessment
6.1.3. Toxicity Assessment
6.1.4. Risk Characterization
6.2. Ecological Risk Assessment
6.2.1. Data Analysis
6.2.2. Exposure Assessment
6.2.3. Toxicity Assessment
6.2.4. Risk Characterization
6.2.5. ATSDR PHA, if applicable
7. Summary and Conclusions
7.1. Summary
7.1.1. Nature and Extent of Contamination
7.1.2. Fate and Transport
7.1.3. Risk Assessment
7.2. Conclusions
7.2.1. Data Limitations and Recommendations for Future Work
7.2.2. Recommended RAOs
Appendices
A. Technical Memoranda on Field Activities, if available
B. Analytical Data and QA/QC Evaluation Results
C. Risk Assessment Methods
Source: <a href="#">Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA</a> (OSWER Directive 9355.3-01)

## **8.4 Feasibility Study**

The overall objectives of the FS are as follows:

- Develop RAOs based on the COCs, the impacted media, COC fate and transport, potential exposure routes, receptors, and PRGs;
- Identify potential chemical-specific, action-specific, and location-specific ARARs. These ARARs are federal and state environmental or facility siting laws and regulations that are evaluated during the FS;



- Develop site-specific cleanup goals based on the CSM, results of the risk assessment, and ARARs;
- Develop, screen, and evaluate potential remedies to identify alternatives that are capable of achieving RAOs. Each remedial alternative should be evaluated against the nine criteria described in the NCP and the [Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA](#) (OSWER Directive 9355.3-01).
- Apply sound engineering judgment and optimization principles to develop remedial alternatives that are implementable, cost-effective, and minimize the environmental footprint of the remedy to the extent practicable. Remedies are to be in accordance with DON [Policy for Optimizing Remedial and Removal Actions at all Department of the Navy \(DON\) Environmental Restoration Program Sites](#) (NAVFAC 5090-Ser 12005/EV3-KB);
- Provide sufficient information about the alternatives to allow decision makers to weigh the negative and positive results of each alternative when selecting a remedy in the PP; and
- Achieve consensus among DON, EPA, state, and local authorities regarding the selected response action; and, in the case of NPL sites, obtain concurrence from EPA.

The end product of the RI/FS is the comparison of remedial strategies supported by valid site data and a risk assessment, which allows decision makers to ultimately select the most appropriate remedy or combination of remedies for a site. More details on the FS process can be found in the NAVFAC BMS.

#### **8.4.1 Applicable or Relevant and Appropriate Requirements**

Under CERCLA §121(d), an important consideration in the FS process is the requirement that RAs comply with federal and state ARARs. DON, as the lead federal agency, is responsible for identifying potential federal ARARs. The lead state agency is responsible for identifying potential state ARARs in a timely manner. An evaluation of the potential ARARs is generally completed in the FS or EE/CA, but ARARs are not finalized until they appear in a ROD/DD. EPA [CERCLA Compliance with Other Laws Manual, Part I](#) (OSWER 9234.1-01) defines ARARs as follows:

“A requirement under other environmental laws may be either ‘applicable’ or ‘relevant and appropriate’ to a RA, but not both. A two-tier test may be applied: first, to determine whether a given requirement is applicable; then, if it is not applicable, to determine whether it is nevertheless relevant and appropriate.”

ARAR identification is a very critical step in the remediation process. Although the selection of ARARs in some cases can be subject to interpretation, once the ARARs are established and documented in the ROD/DD or AM, they become legally binding. In cases where it is unclear if a requirement is an ARAR, it is recommended that legal counsel be consulted. All draft RODs/DDs should be reviewed by DON counsel prior to external review.

Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, RA, location, or other circumstance at a CERCLA site. Table 8-2 describes the different types of applicable requirements.

An applicable requirement is a requirement that DON would have to comply with by law if the same action were being undertaken apart from CERCLA authority. For example, the MTR for landfills under RCRA would apply if a new hazardous waste landfill unit (or expansion of an existing unit) was the selected remedy for a CERCLA site.

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations issued under federal or state

environmental law that, although not “applicable” to a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site so that their use is well-suited to the particular site. Therefore, ARARs should be narrowly tailored and the ARARs table should list only the specific sections or subsections of any regulation identified.

**Table 8-2 Types of Applicable or Relevant and Appropriate Requirements**

<b>Chemical-specific ARARs</b>	<p>Used to set health-based limits or ranges in various environmental media for specific hazardous substances or pollutants or contaminants. Examples include MCLs, Federal Water Quality Criteria, National Ambient Air Quality Standards, and RCRA Groundwater Protection Standards.</p> <p>These requirements may set protective cleanup levels for the COCs in the designated media or indicate an acceptable level of discharge (e.g., air emission or wastewater discharge), where chemical discharge occurs in a remedial activity. The more stringent ARAR should be complied with if the chemical has more than one such requirement. There are at present a limited number of actual chemical-specific requirements.</p>
<b>Action-specific ARARs</b>	<p>Used to set controls or restrictions on particular kinds of activities for management of hazardous substances or pollutants or contaminants. Examples include:</p> <ul style="list-style-type: none"> <li>• RCRA regulations for closure of hazardous waste storage or disposal units;</li> <li>• RCRA incineration standards; and</li> <li>• CWA pretreatment standards for discharges to publicly-owned treatment works referenced in 40 CFR Part 403.</li> </ul> <p>These requirements are triggered not by the specific chemicals present at a site but by a particular activity that is selected to accomplish remediation. Several alternative actions are usually available for any remedial site, so very different requirements can come into play. These action-specific requirements may specify particular performance levels, actions, or technologies as well as specific levels (or methodology for setting specific levels) for discharged or residual chemicals.</p>
<b>Location-specific ARARs</b>	<p>Used to set restrictions on activities depending on the characteristics of a site or its immediate environs. Examples include:</p> <ul style="list-style-type: none"> <li>• Federal and state siting laws for hazardous waste facilities;</li> <li>• Sites located adjacent to wetlands or surface water bodies;</li> <li>• Locations with protected species; and</li> <li>• Sites listed on, or eligible for listing on, the National Register of Historic Places.</li> </ul>

The relevance and appropriateness of a requirement can be judged by comparing a number of factors including the characteristics of the RA, the hazardous substances in question, or the physical circumstances of the site with those addressed in the requirement. For example, although RCRA-regulated unit closure regulations may not be directly applicable to the cleanup of undisturbed

contaminated media, if capping is contemplated these regulations may be relevant and appropriate requirements. A requirement that is determined to be both relevant and appropriate shall be complied with to the same degree as if it were applicable. It is possible for only part of a requirement to be considered relevant and appropriate. When applying relevant and appropriate requirements as ARARs, it is important to prevent the misapplication that may result in an overly stringent requirement. Consider the example presented above where RCRA regulations for closure were applied to determine capping as an ARAR. If the material was merely debris rather than hazardous waste, it would not be appropriate to apply the required components of a cap that meets RCRA hazardous waste closure requirements.

#### **8.4.1.1 Applicable or Relevant and Appropriate Requirement Determinations**

ARARs can only be identified on a site-specific basis. ARAR determinations involve both legal and technical considerations and thus may benefit from a team approach involving DON legal and technical staff and contractors. Documents containing the evaluation of potential ARARs or the identification of final ARARs should be reviewed by DON counsel prior to releasing them for external review.

CERCLA provides that in some instances state environmental laws that are even more stringent than federal cleanup standards may apply to RAs undertaken by DON. For any RA where hazardous substances will remain on-site at its conclusion, any state ARAR which is more stringent than any federal ARAR is to be applied to the RA if the state identifies it in a timely manner and the DON has not waived the ARAR (42 USC §9621[d][2][A][ii] and [d][4]). Although DON requests the state to identify potential state ARARs, the final determination regarding ARAR status is made by the DON in the ROD/DD. To qualify as a state ARAR under CERCLA and the NCP, a state requirement must be:

- A state law or regulation;
- An environmental or facility siting law or regulation;
- Promulgated (of general applicability and legally enforceable);
- Substantive (not procedural or administrative);
- More stringent than federal requirements;
- Identified in a timely manner; and
- Consistently applied.

It is important to be as specific and narrow as possible when identifying a potential ARAR. The circumstances of each ARAR should be considered and legal counsel should be consulted.

#### **8.4.1.2 ARAR Toolkit**

To assist RPMs with addressing ARARs at a given site, an [ARAR Toolkit](#) was developed. The ARAR Toolkit does not supersede existing installation or command-specific approaches, but rather it provides RPMs a resource to better understand the following information:

- What ARARs are;
- How to identify ARARs for remedial actions;
- Why ARARs are critical;
- How to effectively document identified ARARs;
- The implications of poorly identified or documented ARARs; and
- The need to always consult DON legal counsel for questions about ARARs.

#### **8.4.1.3 On-site Cleanup versus Off-site Disposal**

Cleanup actions conducted entirely on-site have different requirements than cleanup actions involving off-site disposal facilities. On-site RAs must comply with ARARs, which should be written so that they include substantive requirements, but not administrative or procedural requirements such as obtaining permits or administrative reviews. On-site actions include the areal extent of contamination and all suitable areas in very close proximity to the contamination that are necessary for the implementation of the response action. EPA interprets on-site to include the surface area, the air above the site, and the hydrogeologic contamination beneath the surface. It is critical to understand that installation boundaries are not relevant. An action could still be on-site and yet extend well beyond the installation boundaries. CERCLA §101 defines “facility” to include any area where a hazardous substance “has come to be located.”

Off-site disposal actions are not covered by ARARs and, therefore, must comply with all applicable legal requirements, both substantive and administrative aspects, including obtaining permits. No analysis of relevant and appropriate requirements is needed for off-site disposal actions and no waivers are available. An example of an off-site disposal action would be an action requiring the off-site disposal of hazardous waste in a landfill or incinerator operated by a waste management company. In that case, all permitting requirements, including administrative requirements, related to the transportation and disposal of hazardous waste must be met. RPMs must verify the status of the EPA permits of the receiving facilities and operators before wastes are shipped off-site. This requirement generally does not apply to laboratory samples and treatability samples of environmental media or wastes.

#### **8.4.1.4 To Be Considered Criteria**

In certain instances, there may not be an ARAR that addresses a particular COC, action, or location. In those cases, the use of To Be Considered criteria can guide decisions. Because To Be Considered criteria are not ARARs, their identification and use are not mandatory. The To Be Considered category consists of advisories, criteria, or guidance developed by EPA, or other state and federal agencies that may be useful in developing CERCLA remedies (40 CFR Part 300.400[g][3]). To Be Considered criteria should be applied with caution because, although they have no legal status prior to ROD/DD execution, once a To Be Considered criterion is included in a ROD/DD as a cleanup standard or approach, it becomes legally binding.

### **8.4.2 Alternative Endpoints and Approaches**

At highly complex sites with technical cleanup challenges, risk management strategies can be used to achieve protectiveness of human health and the environment. Alternative endpoints are formal designations for alternative remedial goals that are permitted by regulations. These alternative remedial goals allow cleanup decisions to be based on current exposure and risk, rather than defaulting to a commonly applied ARAR. They include ARAR waivers, such as technical impracticability waivers, state designations such as plume management zones, alternate concentration limits (ACLs), and groundwater reclassification. Alternative approaches are strategies to meet traditional endpoints over the long-term. They include approaches such as MNA over long timeframes, adaptive site management, and low-threat closure.

#### **8.4.2.1 Applicable or Relevant and Appropriate Requirement Waiver**

An RA shall meet all federal and state ARARs upon completion unless one of the following waivers is found applicable under CERCLA §121(d)(4)(A-E):

- **Interim Action:** The RA selected is only part of a total RA that will meet the ARAR when completed;

- **Greater Risk to Health and the Environment:** Compliance with the ARAR at the site will result in greater risk to human health and the environment than alternate options;
- **Technical Impracticability:** Compliance with the ARAR is technically impractical from an engineering perspective;
- **Equivalent Standard of Performance:** The selected RA will attain a standard of performance that is equivalent to that required under the otherwise applicable requirement through use of another method or approach; or
- **Inconsistent Application of State Standard:** For state ARARs, the state has not consistently applied (or demonstrated the intention to consistently apply) the ARAR in similar circumstances at other RAs within the state (42 USC §9621 [d][4][A-F]; 40 CFR Part 300.430[f][4][ii][C]).

If an ARAR is waived for a proposed RA, CERCLA requires that, at least 30 days prior to the publication of the ROD/DD, DON provide the state with an opportunity to concur with or not concur with the proposed RA (42 USC §9621 [f][3][A]). Should the state concur with the proposed RA or fail to object to the action within the 30-day period, the RA may proceed. On the other hand, if the state does not concur with the RA proposed and desires to have the RA conform to the ARAR, the state may bring an action in the U.S. District Court within 30 days of notification to determine whether the RA selected is supported by substantial evidence.

Waivers pertain to RAs, but not removal actions. The NCP requires remedies to either attain or waive ARARs during the course of the RA. The NCP requires removal actions to attain ARARs to the extent practicable, considering the urgency of the situation at the site. In removal actions where the attainment of ARARs is not practicable, documentation shall be produced explaining why the removal precludes the attainment of all ARARs.

Additional guidance to identify and comply with ARARs can be found in:

- EPA [CERCLA Compliance with Other Laws Manual, Part I](#) (OSWER 9234.1-01) and [Part II](#) (OSWER 9234.1-02);
- EPA [Compendium of Federal Facilities Cleanup Management Information](#) (OSWER 9272.0-14);
- EPA [Clarification of the Role of Applicable, or Relevant and Appropriate Requirements in Establishing Preliminary Remediation Goals Under CERCLA](#) (OSWER 9200.4-23); and
- EPA ARARs from the [CERCLA/Superfund Orientation Manual](#) (EPA 542/R-92/005). This guidance provides a template to be used for the ARAR analysis that would be part of an FS and EE/CA, along with instructions for performing the ARAR analysis.

### Technical Impracticability Waiver

A Technical Impracticability Waiver (TIW) is a type of ARAR waiver specific to the cleanup requirements for given contaminants within a defined area and depth. It applies at sites where it is technically impracticable to meet cleanup requirements within a reasonable timeframe. Most TIW sites have complex hydrogeology, DNAPL source zones, or extensive contaminant sources.

For a TIW to be granted one of two criteria must be met:

- Engineering infeasibility, which is the criteria applied when the engineering methods developed to achieve the ARAR cannot be reasonably implemented, and
- Unreliability, which is the criteria applied when it can be shown that the remedial alternatives are not likely to be protective in the future.

The TIW process can be initiated at any time during the CERCLA process. Its timing is dependent upon having sufficient site characterization data to determine the restoration potential and to demonstrate impracticability. Figure 8-5 illustrates how the TIW process can occur on the front-end (Pre-ROD) or the back-end (Post-ROD). A front-end TIW is based on the initial site characterization such as the RI/FS and is incorporated into the CERCLA ROD. A back-end TIW is one that is initiated when a final remediation system is already installed and operating. Back-end TIWs are generally incorporated as a ROD Amendment. An interim RA can also lead to a TIW. EPA [Guidance for Evaluating the Technical Impracticability of Groundwater Restoration](#) notes that in most cases TIW decisions should be made after remedial efforts have been implemented so that the effectiveness of the remedy can be properly evaluated.

#### **8.4.2.2 Alternative Concentration Limits**

For drinking water, MCLs generally are ARARs. However, depending on the contaminant type and site-specific conditions, remediation to MCLs is sometimes very difficult or even impossible to achieve. In these situations, if the groundwater is not currently being used for drinking water, the likelihood and the timeframe for its use as drinking water may be important considerations. Another important consideration when determining the appropriate cleanup goals is the relationship of the groundwater to other water bodies, such as discharge to surface water, which may affect the criteria that will be applied to the site. In some cases, for sites where surface water is the nearest downgradient receptor, it may be possible to develop ACLs. ACLs are risk-based limits that can be used to establish alternate groundwater protection standards. [ACLs](#) are outlined in CERCLA §121(d)(2)(B)(ii) and NCP §300.430(e)(2)(i)(F). When establishing ACLs, there are three specific conditions that must be met:

- There are known and projected points of entry where groundwater discharges into surface water;
- There are no statistically significant increases of concentrations in the surface water body or reason to believe accumulation of constituents may occur downstream; and
- Institutional controls are in place to prevent human exposure to the groundwater between facility boundary and all known and projected points of discharge into the surface water.

Typically when establishing ACLs a point of compliance and a point of exposure must be designated where ACLs must be met. More information on ACLs can be found in EPA [Use of Alternate Concentration Limits in Superfund Cleanups](#) (OSWER Directive 9200.4-39) and ITRCs [Using Remediation Risk Management to Address Groundwater Cleanup Challenges at Complex Sites](#). In addition, some states, such as Texas and Florida, have regulations and guidance on using ACLs or similar risk management options, depending on site-specific conditions, the stability of the plume, or technical practicability. The RPM should determine the specific regulations and guidance applicable to the site and how these apply to the beneficial use of groundwater including municipal, agricultural, or industrial purposes. In some states, groundwater may be broadly designated for beneficial use as drinking water even in areas where it does not meet the criteria for use as drinking water. In such cases, the RPM should request guidance from DON counsel regarding ARAR status of drinking water standards and defining the potential path forward.

If achieving MCLs is required but the groundwater is not expected to be used as drinking water in the near future, it is possible that the cleanup technology or combination of technologies using the treatment train and/or target treatment zone concepts may be selected to focus on achieving the MCLs but only in the long term.

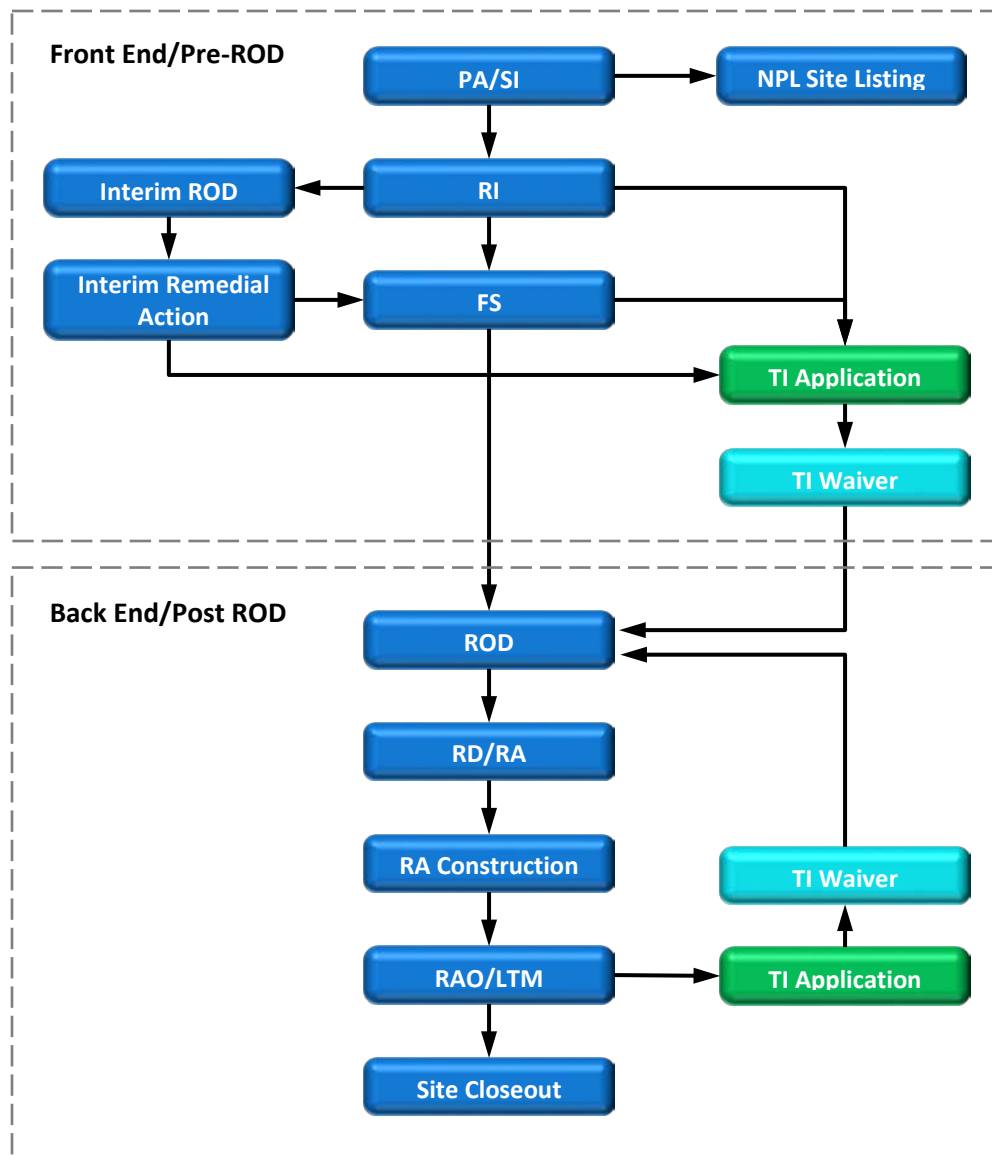


Figure 8-5 When to Apply for a Technical Impracticability Waiver

#### 8.4.2.3 Functional Objectives as an Alternative Approach

Functional objectives are established to measure progress in achieving remedial action objectives for complex sites that typically require long remediation timeframes and active remediation systems. The American Management Association (AMA), among others, recognizes the crucial role of developing good objectives prior to starting virtually any project. The AMA provides the acronym “SMART” (Specific, Measureable, Attainable, Relevant, and Time-Bound) to convey the attributes of good objectives. Functional objectives can be adjusted as necessary to meet the SMART attributes by asking the diagnostic questions about each.

The objectives set for complex sites such as chlorinated-solvent sites have rarely been attainable at reasonable cost and within practical timeframes. A handful of chlorinated-solvent sites have been remediated to the point of closure and unrestricted use ([DNAPL Remediation: Selected Projects Where Regulatory Closure Goals Have Been Achieved-Status Update](#) [EPA/542/R-09/008]), but it is far more common to have residual contamination above MCL values even after aggressive treatment so that interim/alternative functional objectives are needed. Examples of such interim/alternative functional objectives might be to reduce concentrations and mass discharge to the point that passive site management can be used to contain and treat the residual contamination or to reduce risks to the point that development can proceed with appropriate exposure controls. The measurability of the objectives can be a concern, especially given the difficulties in measuring mass and concentrations in some compartments (e.g., lower-permeability zones) and the natural variations in groundwater data.

A wide range of restoration timeframes have been used for site cleanups, generally 30 to >100 years. The timeframe required to treat chlorinated solvents in groundwater to concentrations less than MCLs (typically an absolute objective) may be several decades to centuries, so shorter-term functional objectives are needed for meaningful and measurable interim steps. The consensus of the ITRC's Integrated DNAPL Site Strategy Team is that detailed predictions beyond a human generation (~20 years) are generally inappropriate when setting functional objectives. Four key reasons are provided for restricting the timeframes for functional objectives at chlorinated-solvent sites:

- While absolute objectives may not be achieved for decades or more, functional objectives that extend beyond a generation (>20 years) do not encourage accountability by the decision makers involved;
- Natural variations in concentrations and aquifer conditions (e.g., groundwater elevations, geochemistry) make it difficult to measure progress towards objectives with longer timeframes;
- The ability to make accurate predictions of performance beyond 20 years is questionable; and
- Scientific and technical abilities are not static, and longer timeframes do not account for these advances.

Although defining functional objectives with timeframes of less than 20 years is encouraged, it is important to remember that the absolute objectives may require management and even subsequent active remediation well beyond such durations. Additional information on functional objectives can be found on the [ITRC](#) website under the Integrated DNAPL Site Strategy Team page.

### **8.4.3 Establishing Cleanup Goals**

The establishment of appropriate cleanup goals is one of the most critical aspects of effective and expeditious CERCLA RAs. Cleanup goals must meet the two threshold NCP criteria, which are: (1) overall protection of human health and the environment, and (2) compliance with ARARs. The cleanup goal addresses the human and ecological risks identified in the RI as warranting a response action (i.e., cancer, non-cancer, or ecological risks, and risk-based chemical standards). Compliance with ARARs may introduce additional requirements that were not considered during risk characterization. If there is not a chemical-specific ARAR (Table 8-2) for carcinogenic COCs, then there is an acceptable range of risk ( $10^{-4}$  to  $10^{-6}$ ) that allows for flexibility in establishing cleanup goals. When establishing the cleanup goals, additional factors that should be considered include current and reasonably anticipated future land use, potential LUCs, and site-specific receptors and assumptions used to develop the risk assessment.

[Navy Policy on the Use of Background Chemical Levels](#) states that background levels shall be evaluated during site investigations and requires that cleanup goals not be set below background levels. Further, cleanup goals should not be developed for chemicals that have not been identified as COCs.



Information contained in the EPA directive [Land Use in the CERCLA Remedy Selection Process](#) (OSWER 9355.7-04) can be useful in establishing a basis for cleanup goals. The directive clarifies how land use assumptions influence the baseline risk assessment, the development of alternatives, and the CERCLA remedy selection process. The EPA directive [Role of the Baseline Risk Assessment in Superfund Remedy Selection Decision Documents](#) (OSWER 9355.0-30) provides guidance on how to use the baseline risk assessment to make risk management decisions such as determining whether RA is necessary and selecting appropriate remedies.

#### **8.4.4 Defining the Remediation Footprint**

The process of identifying the remediation area or footprint follows the identification of cleanup goals. Cleanup goals are used to determine the area of attainment (AA), which is defined as the area where cleanup goals are exceeded. Subsequently, the remediation strategy can then be conceptualized based on the size of the AA and the concentrations of COCs within the area. A large AA often makes it ineffective and uneconomical to solely rely on an active remedy approach. In this case, the approach typically consists of an active remedy in a portion of the AA that has high COC concentrations and a passive remedy for the remaining AA. Although later refined in the RD phase, it is also critical in the FS process to have a preliminary understanding and estimate on the mass and distribution of COCs within the AA. This understanding leads to a better remedial strategy and estimate of the remediation timeframe and cost.

#### **8.4.5 Remedial Action Objectives**

RAOs should provide a clear and concise description of what the RA should accomplish, and reflect the expected future use of a site. They should express how to protect human health and the environment rather than requiring a particular remedial technology to be operated until final cleanup goals are achieved. For example, an RAO may be to limit human and ecological exposure to contaminated material above a certain level for a specified period of time, rather than achieving a numeric cleanup goal.

In some cases, DON may prefer to achieve cleanup goals that have been determined to be protective of human health and the environment in order to obtain UU/UE of the property. Cleanup goals may be established based on regulatory standards, such as MCLs for groundwater used as a drinking water source or site-specific risk-based values that have been calculated during the RI/FS. If cleanup goals are used as RAOs, the wording should be flexible enough to respond to situations where it becomes impracticable to achieve those levels rather than relying on fixed quantitative cleanup goals. For example, at sites contaminated with light, nonaqueous-phase liquids (LNAPLs), RAOs should be based on goals that “remove LNAPL to the extent practicable” rather than on more static or fixed numerical requirements. This can be demonstrated by employing “best available technologies or presumptive remedies” for source removal/treatment, which significantly reduces further contaminant releases to sensitive receptors and/or environmental media. The RAO may also specify a containment remedy or any controls put in place to be protective of human health and the environment. Some examples include: the use of LUCs, methods to prevent exposure via direct contact, controlling the migration of contaminant in groundwater, and preventing vapor migration from impacting indoor air quality.

Additional discussion about RAOs is included in the DON [Guidance for Optimizing Remedy Evaluation, Selection, and Design](#) (UG-2087-ENV).

It is important that RAOs be revisited throughout the phases of the ER process as regulations, understanding of site conditions, and project requirements change. A review of the RAOs should be part of an optimization review performed during RA-O and LTMgt as discussed in the DON [Guidance for Optimizing Remedial Action Operation \(RA-O\)](#) (UG-NAVFA-EXWC-EV-1301).

#### 8.4.6 Identification and Screening of Remedial Alternatives

After RAOs have been developed for each identified target treatment zone, a concise list of potential remedial technologies applicable to each treatment zone is developed and screened. The general categories of RAs are listed below in order of actions generally requiring lower logistics and/or costs to those actions requiring greater logistics and/or costs:

- NFA;
- LUCs;
- Containment and other engineering controls;
- MNA;
- In situ treatment/mass removal; and
- Ex situ treatment/mass removal.

The process of identifying, evaluating, and selecting the appropriate remedy begins with a review of remedial technologies and methods that are appropriate to address the site risks. Information about common and innovative technologies can be found on the [NAVFAC ERB website](#). Appropriate technologies and LUCs are combined on a site-by-site basis to formulate complete, protective alternatives for permanent remediation. The set of alternatives being developed for evaluation shall include a no action alternative. Resources should not be expended on sites that pose little or no threat to human health or the environment.

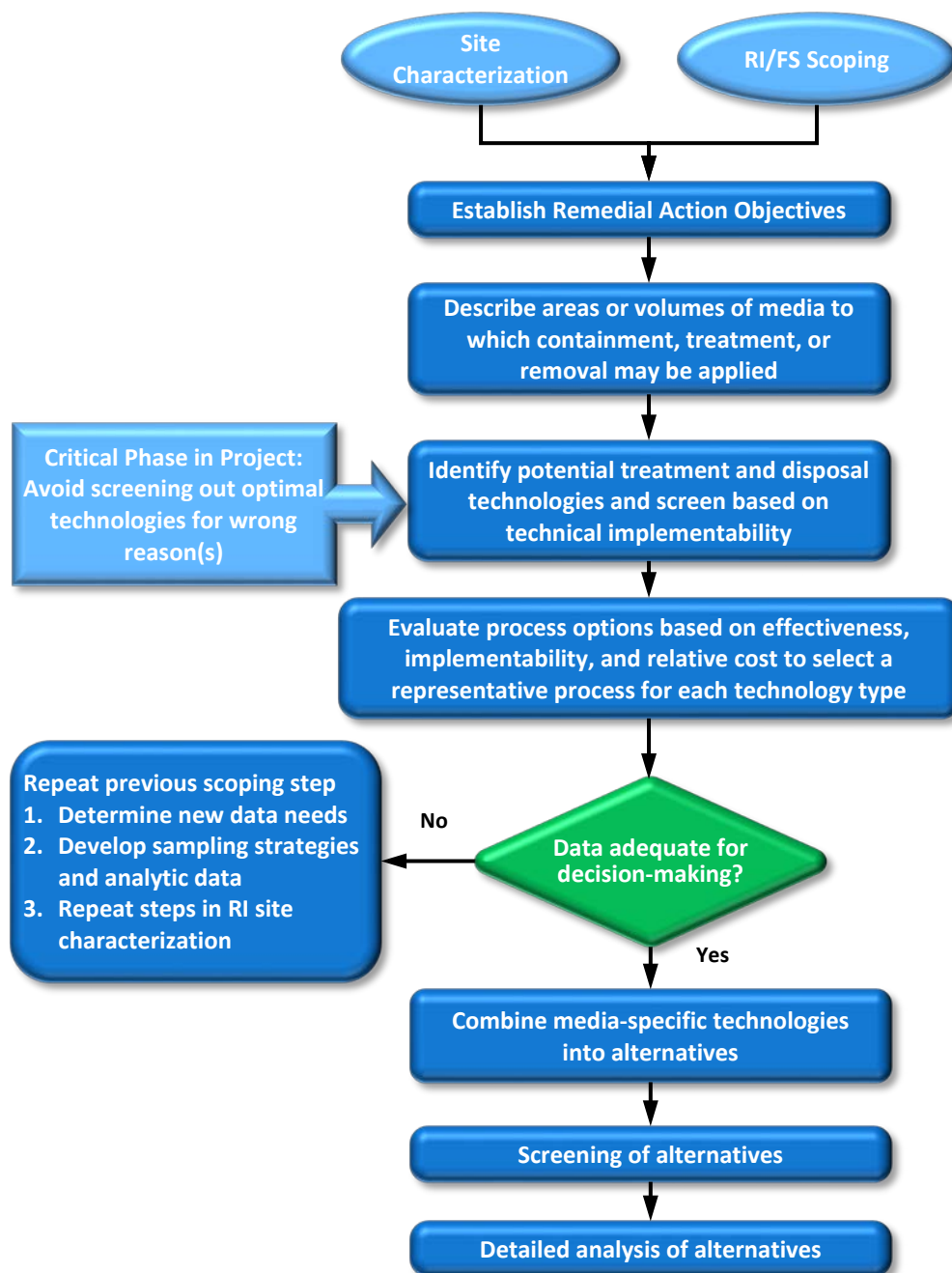
Figure 8-6 presents a flow diagram showing the elements of the process for developing remedial alternatives and how these elements are interrelated.

Alternatives identified in the first step of the FS may need to be screened using three broad criteria in order to select a reasonable number of alternatives for detailed analysis. The short-term and long-term aspects of these criteria should be used to guide the development and screening of remedial alternatives as appropriate and to the extent sufficient information is available:

- Effectiveness in reducing the threat;
- Ease of implementation; and
- Cost.

Table 8-3 lists some actions an RPM can take during this initial screening to ensure that optimal technologies are not prematurely screened out.

**Effectiveness:** This criterion focuses on the degree to which an alternative reduces toxicity, mobility, or volume through treatment; minimizes risks and affords long-term protection; complies with ARARs; minimizes short-term impacts; and how quickly the alternative achieves protection. Adverse environmental impacts that are predictable at this stage also should be considered in evaluating effectiveness. Calculations, assumptions, and references supporting these evaluations will be documented in the FS.



**Figure 8-6 Development of Alternatives**

**Ease of Implementation:** Ease of implementation focuses on the technical feasibility and availability of the technologies each alternative would employ and the feasibility of implementing the alternative. Alternatives that are technically or administratively infeasible or that would require equipment, specialists, or facilities that are not available within a reasonable period may be eliminated from further consideration. Factors such as constructability, expected opposition from the public, impact on the installation's mission, compatibility with planned land uses, and availability of material, equipment, technical expertise, or off-site treatment and disposal facilities also may be considered in evaluating ease of implementation.

**Table 8-3 Review of Initial Screening of Alternatives**

<b>Issues that may cause an optimal technology to be prematurely screened out</b>	<b>RPM actions to ensure optimal technologies are not prematurely screened out</b>
The technology is either not suitable for initial site conditions, not capable of meeting cleanup goals, not effective for all COCs, or not effective for all media or all areas of a site but could be used as a component of the initial or subsequent treatment train remedy to reduce overall cost or risk	Ensure that the treatment train concept has been applied to allow appropriate use of technologies
The technology is initially not acceptable to regulatory agencies or stakeholders as a result of past experience when it was misapplied	Communicate with regulators and stakeholders to understand where there was experience with failure, understand why it failed, and determine if the proposed applications would have the same issues
The technology is believed to be too expensive due to inconsistencies in cost-estimating, overly conservative assumptions, or misapplication	Ensure cost estimating for all technologies is based on realistic assumptions
The site characteristics are not well understood causing an invalid assumption that application of the technology is infeasible	Consider field testing rather than assuming a technology is not feasible based on rules of thumb  Confirm that decisions are based on accurate and representative data properly interpreted and re-analyze data or go back to the field if necessary
RAOs are not defined or not reasonable	Develop risk-based RAOs
Recent advances in technology are not known	Obtain most up-to-date information on technological advances
Project life-cycle characteristics were not considered, which would allow the technology to be suitable at some time in the future	Understand typical life-cycle behavior
Restrictions at the installation cause the technology to be eliminated without fully exploring all options with installation personnel	Work with facility management to overcome implementation issues

**Cost:** A detailed life-cycle cost analysis is not necessary for comparison of alternatives at this stage of the remedy selection process. A less detailed cost comparison based on relative cost of the alternatives (e.g., low, medium, high) is more suitable. The relative costs should be based on engineering judgment, which includes capital, O&M, and monitoring cost considerations.

**Other Factors for Consideration:** Alternatives that offer significant advantages by one criterion should be retained for detailed analysis even if they are inferior by other criteria. Once a set of alternatives subject to detailed analysis is identified, they should be reviewed for potential action-specific ARARs. Descriptions

of the alternatives and potential ARARs should normally be transmitted to state regulatory agencies for identification of any state ARARs that may be more stringent. If off-site activities require the submittal of permit applications, this may require considerable time and effort and should be identified as early as possible in the remedial process. This review also will determine whether any treatability studies are needed either to better define or cost an alternative or to provide information for predicting an alternative's effectiveness and environmental impacts.

When making a decision during the screening process, it is crucial that the RPM carefully evaluates the merits of each technology to avoid screening out an optimal technology for the wrong reason. The RPM should keep in mind that in most cases, multiple technologies are applied as part of a treatment train. An example of a treatment train is the in situ treatment of a highly-contaminated source area to reduce contaminant mass followed by MNA to polish residual concentrations in the source area and the remaining contaminant plume. For more information regarding treatment trains, see DON [Guidance for Optimizing Remedy Evaluation, Selection, and Design](#) (UG-2087-ENV).

The use of treatment trains allows technologies to be retained to address only a particular part of the site, media, COC, or project phase. Technologies that have been found to be effective at other sites under similar conditions, or have relatively low cost and risk of implementation, should be retained unless there is a valid reason for screening them out. In most cases, passive technologies such as MNA with LUCs should be retained either as a stand-alone remedy or as an important part of the overall remedy, particularly as part of an exit strategy in the latter phases of remediation to efficiently polish residual concentrations following implementation of other technologies. An optimal technology can be one of several technologies that form the optimal overall treatment train.

When reviewing the initial screening of alternatives, the RPM should keep in mind various issues that could cause an optimal technology to be prematurely screened out as shown in Figure 8-6. In all cases, review rationale for elimination of each alternative to ensure reasons are valid, and consider use of an optimization review team.

#### **8.4.6.1 Approaches to Remedial Technology Selection**

When considering the appropriateness of the remedial alternatives being screened, the RPM should consider that risk management (e.g., institutional controls and containment) may be more cost-effective than cleanup at certain sites. That is, a remedy can achieve protectiveness of human health and the environment through the elimination of exposure pathways or preventing contact with receptors, rather than by eliminating sources of contamination. Such an approach may be the only technically practicable means of managing risks at sites involving complex, heterogeneous hydrogeology and recalcitrant contaminants, such as DNAPL. In performing the evaluation between risk management controls versus active cleanup, the cost of LTMgt of the controls as well as impacts on potential future land use shall be considered. LUCs are typically part of a treatment train used in conjunction with active and passive remedies. Similarly, a combination of RA categories is often used in a treatment train approach such as in situ treatment/mass removal, containment, and LUCs.

Any relevant historical information such as treatability studies or actual remedies implemented at the same installation or having similar environmental conditions can be useful for selecting applicable technologies. To the extent possible, presumptive remedies, and those remedies that are successful and cost-effective (best available technologies), should constitute the initial remedial alternative list. Presumptive remedies are standard technologies that can be applied at certain types of sites, such as municipal landfills or soils impacted with VOCs. They are designated by EPA based on historical patterns of remedy selection, past experience, and technology performance. EPA expects presumptive remedies

to be considered at all applicable sites, as specified on the EPA [Presumptive Remedies: Policy and Procedures](#) website.

Cost estimates can vary significantly for a given technology at different sites, and it is important to distinguish independent objective literature from vendor information to obtain reliable cost estimates. Therefore, resources available on the Internet, such as the websites for remedy selection listed in Appendix D, can be valuable in making correct decisions.

#### **8.4.6.2 Treatability Studies**

A treatability study involves testing and evaluating a treatment technology to determine its effectiveness at a particular site or to establish site-specific design parameters. Treatability testing could be performed either at the bench-scale level (on- or off-site), or at the pilot-scale level. Treatability studies are most often used to determine which remedial alternative better addresses site-specific conditions such as COCs and matrix effects (e.g., clays). These studies can be applied for remedy screening, selection, and design, and should be carefully designed to meet DQOs/PQOs for the project. The additional costs for conducting treatability studies is often justifiable as these studies can significantly reduce the uncertainties that are sometimes associated with innovative technologies, or are inherent with complex treatment trains.

Treatability studies may be needed during the FS when sufficient information for technology cost and performance, under site-specific conditions, is not available. For these technologies, laboratory-scale and/or bench-scale treatability studies may be conducted to obtain the required information. This information is necessary for applying the nine NCP criteria to evaluate alternatives in the FS. A treatability study should verify whether the technology is capable of meeting the cleanup goals or other specified performance objectives if it is part of a treatment train.

Treatability studies may also be needed during the Remedial Design/Remedial Action (RD/RA) phase to obtain more detailed information about the unit operations, performance, and cost for designing a full-scale treatment system. Generally, a pilot/field-scale system is deployed on-site to collect the required information.

#### **8.4.7 Remedial Alternatives Analysis**

Upon completion of the screening of remedial alternatives, the DON [Policy for Optimizing Remedial and Removal Actions at all DON Environmental Restoration Program Sites](#) (NAVFAC 5090 Ser 12005/EV3-KB) requires that a remedial alternatives analysis (RAA) be prepared for all remedy evaluation documents. The [Remedial Alternatives Analysis Guidance](#) provides background information on the RAA process and detailed guidance on preparing RAA deliverables. The goal of the RAA review is an early and expedited optimization review of the remediation alternatives that will ultimately be analyzed in the detailed analysis of remedial alternatives. RAAs provide the opportunity to align the remedial alternatives with RAOs that are consistent with the on-site risk for current and reasonably anticipated future land use. The RAA review also ensures that potentially applicable remedial options are not removed too early in the remedy selection process and that other appropriate remedies are not overlooked. The RAA is expected to reduce the time and effort that goes into remedy evaluation and SC.

The RAA guidance includes a template to be used as a standardized planning tool in the early stages of the remedy evaluation phase of the ER project. The RAA document summarizes the CSM, the RAOs, the PRGs, the previously screened alternatives, and the rationale for choosing the remedial alternatives that are retained for detailed comparative analysis.

#### **8.4.8 Detailed Analysis of Remedial Alternatives**

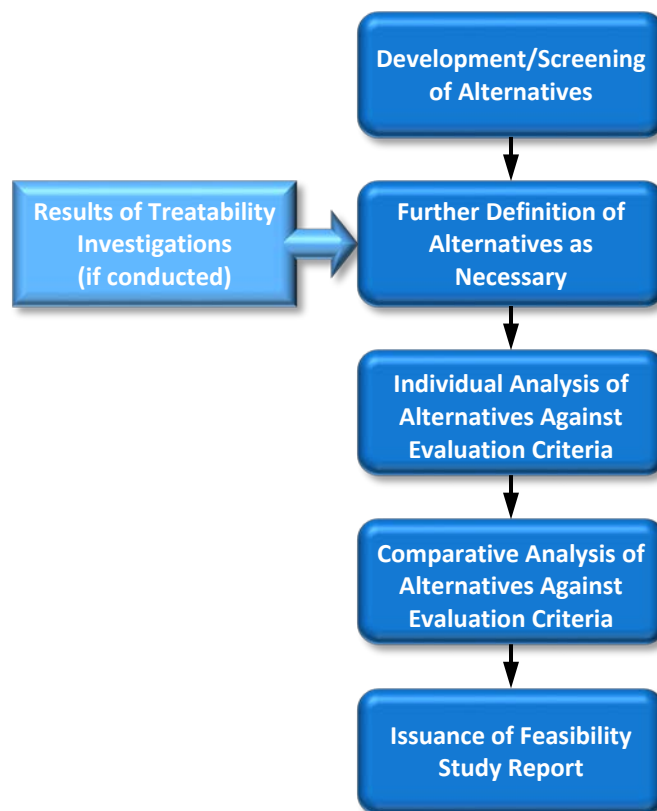
Once a reasonable number of viable alternatives have been identified through screening and RAA, and ARARs have been identified, the alternatives are evaluated against nine criteria as specified in 40 CFR Part 300.430 and listed in Table 8-4. The two criteria of state and local community acceptance may not be evaluated fully until the PP is published and public review is completed during Remedy Selection (Chapter 9).

**Table 8-4 Summary of the Nine NCP Criteria**

Category	Criteria	Description
Threshold Criteria	Overall protection of human health and the environment	Addresses whether or not a specific alternative will achieve adequate protection and describes how the contamination at the site will be eliminated, reduced, or controlled through treatment, engineering, and/or LUCs.
	Compliance with ARARs	Addresses whether or not a remedial alternative meets all related federal and state environmental statutes and regulations. An alternative shall comply with ARARs, or be covered by a waiver, to be acceptable.
Primary Balancing Criteria	Long-term effectiveness and permanence	Addresses the ability of a remedial alternative to maintain reliable protection of human health and the environment over time. It also considers the risk posed by treatment residuals and untreated materials.
	Reduction in toxicity, mobility, or volume through treatment	Addresses the preference for RAs that use treatment technologies that permanently and significantly reduce toxicity, mobility, and/or volume of contaminants.
	Short-term effectiveness	Addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community, and the environment during construction and operation of the remedy.
	Implementability	Addresses the technical and administrative feasibility of implementing a remedial alternative from design through construction and operation. Factors such as availability of services, materials, and operational reliability are considered.
	Cost	Addresses the total cost of a remedial alternative, including consideration of the capital costs, annual O&M costs, and net present value (NPV) of these costs.
Modifying Criteria	State acceptance	Addresses the acceptability of a remedial alternative to state regulatory agencies.
	Community acceptance	Addresses the acceptability of a remedial alternative to the public.

Shaded rows represent criteria that provide opportunities for GSR assessment.

These nine evaluation criteria are categorized into three groups: threshold criteria, primary balancing criteria, and modifying criteria. All threshold criteria must be satisfied for a remedial alternative to be eligible for selection. The primary balancing criteria are used to weigh major trade-offs among alternatives. The modifying criteria address public and regulatory acceptance of the alternatives. Again note that a remedial alternative may be a single technology, but more often it is a combination of technologies employed sequentially over time in a treatment train remedial system. Additionally, a combination of technologies may be employed concurrently to address different areas of the site. Figure 8-7 shows the key elements of the detailed analysis of alternatives and the relationship of these elements.



**Figure 8-7 Detailed Analysis of Alternatives**

#### **8.4.8.1 Optimization and Green Sustainable Remediation Considerations**

DON [Policy for Optimizing Remedial and Removal Actions at all DON Environmental Restoration Program Sites](#) (NAVFAC 5090 Ser 12005/EV3-KB) requires continual optimization of remedies in each phase of the remedial process. Optimization practices maximize DON ERP effectiveness and minimize DON ERP financial liabilities and environmental footprints. More detail on optimization during phases of the remedial process can be found in the NAVFAC BMS.

GSR is implemented as part of the existing ER optimization program, and is described in DON [Guidance on Green and Sustainable Remediation](#) (UG-2093-ENV, Rev. 1). This document provides RPMs and consultants with a clear approach to incorporating GSR considerations into the current remediation process.

The detailed analysis of alternatives includes GSR analysis of each of the alternatives evaluated in the remedy evaluation documents. For this phase of the optimization process, the SiteWise™ Tool is used to conduct a remedy footprint analysis of each alternative. Additional remedy footprint analysis tools can also be used, but only in conjunction with or after an analysis using the SiteWise™ tool. The GSR metrics used for this analysis may include GHG emissions, energy consumption, criteria air pollutants, water impacts, ecological impacts, resource consumption, worker safety, and community impacts. Additional information about the SiteWise™ tool as well as a downloadable user guide and current version of the tool is available on the [NAVFAC ERB website](#) under Green and Sustainable Remediation.



The results of the sustainability analysis are then used to support remedy selection. The white paper [Integrating Green and Sustainable Remediation Metrics within the CERCLA Process during the Feasibility Study](#) provides further guidance on how to integrate the various GSR metrics with the CERCLA nine criteria shown in Table 8-4. Some of the NCP criteria include elements related to GSR and thus provide an opportunity to incorporate GSR assessment into the remedy selection process. The shaded items in the following table highlight these NCP criteria.

#### **8.4.8.2 Remedial Technology Selection Criteria**

Each remedy that is to undergo detailed evaluation should be developed in accordance with DON [Policy for Optimizing Remedial and Removal Actions at all DON Environmental Restoration Program Sites](#). This policy references several guidance documents including the DON [Guidance for Optimizing Remedy Evaluation, Selection, and Design](#) (UG-2087-ENV), which applies to the remedy development and evaluation phases of a project. This guidance document discusses each of the concepts, as listed below, that should be incorporated into the development of each remedial approach.

- Develop remedy based on an updated CSM;
- Identify clear, concise, and flexible RAOs and revisit them periodically to incorporate current regulations, standards, requirements, and other precedents. RAOs should be risk-based where appropriate;
- Identify the target treatment zone(s) based on the CSM and RAOs. A target treatment zone is the volume or area at which the RA is determined to best apply. A typical example of a groundwater site divided into target treatment zones would be: (1) a source area that includes active treatment to reduce contaminant mass, and (2) a downgradient dissolved phase plume that employs MNA or other passive technologies to efficiently polish the lower concentration areas;
- Develop remedial alternatives that include treatment trains, as appropriate, for each target treatment zone, incorporating typical life-cycle behavior. The treatment train concept emphasizes that multiple remedial technologies, either simultaneously or sequentially over time, are often needed to achieve cost-effective remediation at a given site. As part of this step, conduct a life-cycle cost analysis to evaluate individual unit processes and the total cost for each remedial alternative. The cost analysis should be refined throughout the remedy selection and design process;
- Develop realistic system performance objectives for each component of the treatment train that account for technology applicability and limitations. Performance objectives are criteria that measure the operational efficiency and suitability of a particular remedial technology; and
- Develop an optimization and exit strategy for each component of the treatment train and the remedy as a whole.

Optimization and exit strategies are means of determining when it is time to stop, modify, or change a particular technology, or terminate all RAs, based on the achievement of previously established performance objectives. Their development and documentation during the FS, ROD/DD, and RD phases is necessary for cost-effective site remediation, and ultimately for achieving timely RC and SC. This prevents the situation where a technology operates beyond its period of optimum usefulness.

The optimal remedial alternative likely will consist of a combination of remedial technologies applied in a treatment train. More aggressive or active treatment technologies (e.g., multiphase extraction, chemical oxidation, air sparging, and excavation) are generally more appropriate for source area remediation than for plume-wide remediation of lower concentration areas. Numerous case studies indicate that active

remedies alone often are not cost-effective in achieving final cleanup goals due to diffusion-limited mass transfer and hydrogeologic constraints. Aggressive, active technologies are typically followed by passive treatment processes (e.g., enhanced bioremediation and/or MNA) to form a cost-effective treatment train solution. At many sites, technologies such as biostimulation have been shown to be an effective treatment for reducing source area concentrations and establishing conditions conducive for MNA to polish residual source area contaminants. At many other sites MNA alone has been demonstrated to be an effective remedy. For remediation of lower concentration areas, such biological treatment processes are often the most effective and efficient remedy.

In most cases, the final portion of the treatment train in both the source area and the remaining plume will include MNA to efficiently polish residual concentrations and/or LTM to ensure that concentration levels continue to decrease or remain at or below the cleanup goals for the site. DON's Natural Attenuation Software can be used to assess the natural attenuation capacity of an aquifer and estimate the time of remediation depending on the amount of source reduction performed. This is a useful tool for the evaluation and design of treatment trains to optimize the overall remedy. This software can be downloaded at [www.nas.cee.vt.edu](http://www.nas.cee.vt.edu). LUCs are typically implemented as part of a treatment train to prevent exposure to site contamination and to prevent unacceptable land use during remedy implementation and RA-O/LTMgt. LUCs should be properly documented in the appropriate installation master planning documents and the NIRIS LUC Tracker.

#### **8.4.8.3 Exit Strategy**

The final step in the remedy development process is to identify performance objectives for each technology within the remedial technology train and then link these objectives to the exit strategy. Defining specific performance objectives is especially critical at sites with challenging features such as complex hydrogeology (e.g., very "tight" or impermeable geologic formations) or certain contaminant types (e.g., DNAPL). These challenges and others may limit the ability of existing technologies to achieve stringent final cleanup goals. In many cases, due to diffusion-limited mass transfer from low permeability layers, remedial alternatives may reach asymptotic mass removal rates before final cleanup goals can be achieved. Therefore, setting practical, technology-based performance objectives as part of a pre-determined decision-making framework is important. This approach allows for greater flexibility in operating the system and also in transitioning between different remedial technologies as remediation progresses. Examples of performance objectives include: (a) reaching asymptotic condition with respect to mass removal rate and/or concentration remaining; (b) exceeding a particular cost-per-pound removed; or (c) the cost-per-pound removed exceeds that of a less active or passive technology that would be the next phase of a treatment train. Other examples of performance objectives for active and passive technologies are presented in DON [Guidance for Optimizing Remedy Evaluation, Selection, and Design](#) (UG-2087-ENV).

The combined use of well-defined performance objectives with the treatment train approach allows for timely transitioning from one phase of the treatment train to the next. This allows the most efficient technology to be used at the appropriate time throughout the project, thus minimizing the time that a non-optimum technology is in use. This point is illustrated in Figure 8-8, which shows the cumulative project cost versus time, demonstrating how the use of a treatment train reduces overall project cost as compared to the continued use of a single technology (no treatment train). It also demonstrates that having well-defined performance objectives further reduces total project cost by transitioning between treatment phases in a timely manner, thereby preventing a technology from operating beyond the time when it is no longer functioning at its optimum effectiveness.

During the remedy evaluation process, it may be necessary to compare the risk reduction with the incremental cost to identify the best remedial alternative. Technologies with a very high life-cycle cost

but with little or no additional benefit in risk reduction should be eliminated from consideration in favor of an alternate remedy that is more cost-effective. According to CERCLA and NCP, all remedies shall be cost-effective. Thus, remedial approaches can be eliminated from consideration if they are either higher in cost than an alternative remedy that is just as protective, or significantly higher in cost than an alternative remedy that is only slightly less protective, as documented in [The Role of Cost in the Superfund Remedy Selection Process](#) (OSWER 9200.3-23FS).

DON [Policy for Optimizing Remedial and Removal Actions at all DON Environmental Restoration Program Sites](#) directs that special care be taken during the evaluation of any remedy that includes the extraction and treatment of groundwater (i.e., pump-and-treat) as a component. DON experience has shown that the use of pump-and-treat is generally ineffective in reaching final cleanup goals and often results in high O&M costs. DON policy requires approval for the installation of a pump-and-treat system at any DON ERP site. The information that must be submitted for approval consideration is discussed in the policy and includes an analysis of remedial alternatives considered and a detailed cost analysis that justifies the use of pump-and-treat.

When performing a cost evaluation, comparable life-cycle cost values should be developed by determining the net present value (NPV) of all project costs.

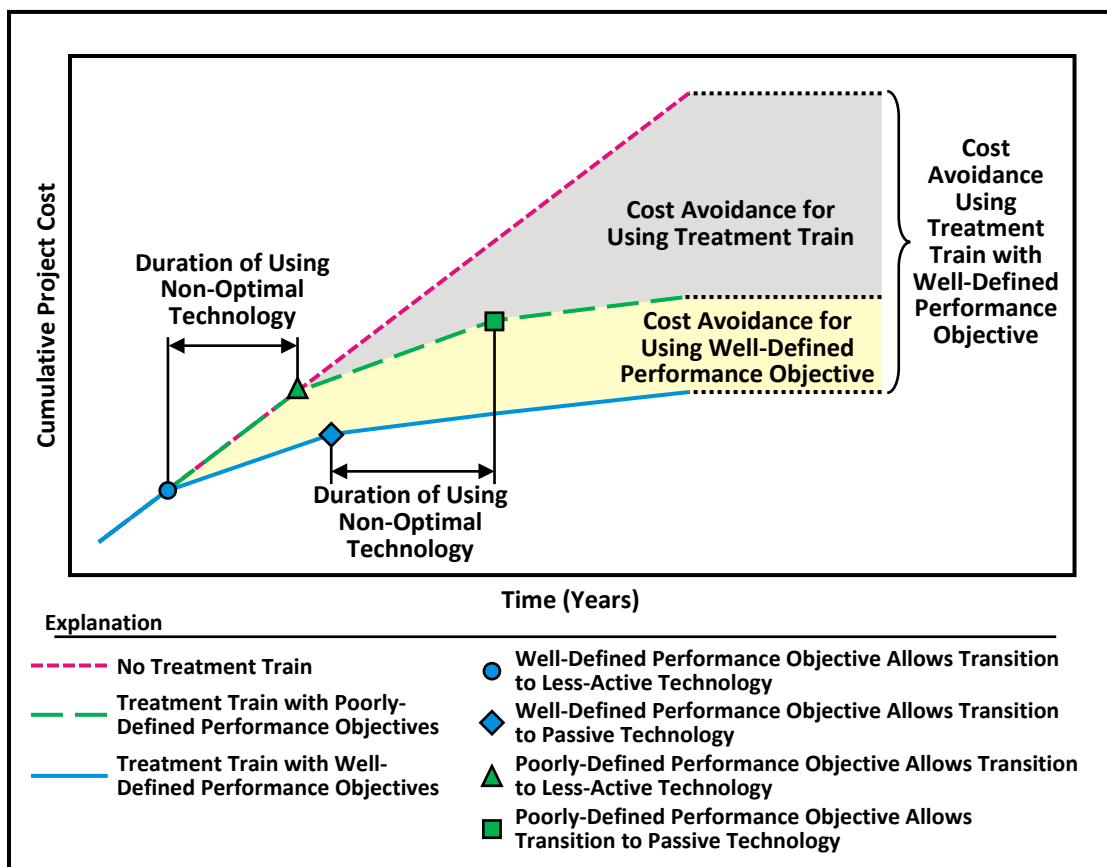


Figure 8-8 Cost Reduction from Treatment Trains and Performance Objectives

#### 8.4.8.4 Cost Calculation for Remedial Alternative

When comparing alternatives, the life-cycle cost of each alternative must consider the capital cost plus all future costs. The projected remediation timeframe used for cost estimation should be based on site-specific information. Future costs include future single payment costs and recurring costs, such as long-term costs for O&M and monitoring. To allow the cost of multiple alternatives to be compared to one another, the life-cycle cost of each alternative must be determined in terms of NPV cost. To determine the alternative's NPV life-cycle cost, the time value of money is considered. The time value of money can be thought of as the amount of money that, if invested now, would be needed to complete remediation, considering the rate of return on the invested amount.

The NPV cost is the sum of the capital cost plus the present value of all future costs (both single payment and recurring costs). For calculating the NPV cost, the following formula can be used to determine the present value of a single payment at some future year:

$$P = F \left( \frac{1}{(1 + r)^n} \right)$$

where P = the present value cost in today's dollars,  
F = the future value in terms of dollars at n years into the future,  
r = the rate of return per interest period, and  
n = the number of compounding periods.

For recurring annual cost, the present value can be calculated by the following formula:

$$P = A \left( \frac{(1 + r)^n - 1}{r (1 + r)^n} \right)$$

Where

P = the present value cost in today's dollars,  
A = the recurring cost for each compounding period,  
r = the rate of return per interest period, and  
n = the number of compounding periods.

The rate of return to be used in the above formulas is established by the OMB for projects funded by the federal government in [OMB Circular A-94 Appendix C](#).

It is important to note that the NPV cost is only considered for the purpose of comparing remedial alternatives and is not used for DON ERP budgeting. Budgeting is based on actual total dollars. The total cost of a remediation project may vary significantly from the NPV, especially at sites with long treatment durations.

#### 8.4.9 Risk Evaluation of Remedial Alternatives

Guidance for both HHRAs and ERAs specifies that Tier 3 in the risk assessment process (i.e., Evaluation of Remedial Alternatives) be performed during the FS. Tier 3 is the evaluation of the remedial alternatives (including no action) with regards to:

- The effectiveness of reducing risks to acceptable levels;
- Human health and/or ecological impacts related to remedy implementation; and
- Residual risks that will remain at a site.

The goal of the Tier 3 evaluation is to ensure that human health and ecological impacts from remedy implementation are considered as a part of each of the nine NCP criteria, and that the selected remedy best balances ecological and human health risks while minimizing ecological impacts. Evaluating the risk posed by the alternative itself (sometimes referred to as comparative risk) is a key component of the alternative evaluation process. Additional information regarding the risk of remedy implementation is presented in the following section.

#### **8.4.9.1 Evaluating Remedy Implementation Risks**

The NCP explicitly cites potential remedy implementation risk as an important consideration in the remedy selection process at Superfund sites and EPA has determined that a quantitative evaluation is useful for sites where exposure levels are expected to change significantly as a result of remediation activities.

Guidelines for evaluating short-term implementation risks to human health are presented in Part C of EPA [Risk Assessment Guidance for Superfund \(RAGS\): Volume I - Human Health Evaluation Manual](#) (EPA/540/R-92/003). According to EPA [Role of the Baseline Risk Assessment in Superfund Remedy Selection Decision Documents](#) (OSWER Directive 9355.0-30) and [Guidelines for Ecological Risk Assessment](#) (EPA/630/R-95/002F), the risks posed to workers and the community during remedy implementation can be evaluated either qualitatively or quantitatively, depending on conditions at the site. Qualitative evaluation is generally appropriate when short-term risks are not expected to be a problem for a site, and quantitative evaluation is used when the remedy will impact the types, levels and/or availability of hazardous substances. Detailed analysis of short-term risks includes the following components for each alternative:

- Evaluate short-term exposure;
- Evaluate short-term toxicity;
- Characterize short-term risks to the community (including people who live or work on or near the site); and
- Characterize short-term risks to remediation workers.

For workers and individuals in the nearby community, the risk analysis should consider:

- Potential for exposure to hazardous substances during on-site remedial activities;
- Potential for injury due to physical hazards, including explosion, heat stress, and precarious work environments; and
- Potential for exposure during emergency response activities.

Failure to adequately evaluate short-term effectiveness during the remedy selection process can result in unanticipated risks to workers and nearby residents during remedy implementation, and in costly delays for substantial remedy modifications or abandonment of an incomplete remedy.

Similarly, the assessment of potential ecological impacts associated with remedy implementation should be considered. Consistent with the provisions of the NCP, [Ecological Risk Assessment and Risk Management Principles for Superfund Sites](#) (OSWER Directive 9285.7-28P) specifies the need to evaluate whether a proposed remedy will cause more ecological harm than the existing site contamination. Also, DON [Policy on Natural Resource Injury and Damages in the Installation Restoration Program](#) states that to the extent practicable, the alternative which causes the least injury to natural resources during implementation should be selected.

The assessment of ecological impacts associated with remedial alternatives should consider several factors including:

- Residual risks posed by site contaminants before and after implementation of the selected remedy;
- Changes in the functional values of each habitat expected to result from the proposed remediation;
- Rate of recovery for the biological community following remediation;
- Designated uses impaired during recovery; and
- The likelihood of the remedial alternatives achieving RAOs.

The decision to implement a remedy for a site based on ecological risk must balance each of these factors. Even though an ERA may demonstrate that adverse ecological effects have occurred or are expected to occur as a result of contamination, it may be determined that removing the contaminated media may not be in the best interest of the overall environment. For example, at sites where rare or very sensitive habitats are present, removal of the contamination may cause more long-term ecological harm due to physical destruction of habitat than leaving it in place. Conversely, leaving persistent and/or bioaccumulative contaminants in place where they may serve as a continuing source of substantial exposure may not be appropriate. If impacts of the remedial alternative are determined to cause more environmental harm than leaving the contaminants in place, it may be decided not to proceed with an active remedy.

Consistent with the NCP and EPA guidance, the RPM should consider the need for conducting a quantitative evaluation and comparison of the following risks associated with each of the remedial activities under consideration:

- On-site worker and off-site resident exposure to emission of vapors and particulates during disturbance, excavation, and/or handling of contaminated materials;
- On-site accidents (physical hazards);
- Off-site accidents, and accident-related spills, injuries, and fatalities associated with transportation of excavated contaminated materials and related remediation materials (e.g., clean backfill); and
- Ecological harm (if applicable).

The SiteWise™ tool can be used to support the quantitative analysis discussed above. Outputs of the tool include the following:

- Number of injuries and fatalities to site workers based on Department of Labor statistics;
- Number of injuries and fatalities from transportation of personnel, equipment and materials based on Department of Transportation statistics;
- Estimated mass of criteria pollutants emitted on or in the vicinity of the site; and
- Estimated total mass of greenhouse gases and criteria pollutants emitted as a result of the RA.

At the conclusion of the Tier 3 risk assessment, the RPM will have an evaluation that identifies each alternative considered, its risk reduction effectiveness, residual risks remaining at a site, potential environmental impacts, cost, technical merits and benefits, and acceptance by DON and the stakeholders. This evaluation will then assist DON in selecting the final remedy for the site.

#### 8.4.10 Feasibility Study Report

The results of the FS will be documented in a report usually provided as preliminary/internal draft for DON review, draft for full regulatory review, and final after comments have been addressed. This is often combined with the RI Report to form an RI/FS Report but the RI and FS Reports also can be submitted separately. Table 8-5 contains the recommended format for the FS report. Details regarding the RI/FS report are presented in EPA [Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA](#) (OSWER Directive 9355.3-01). The RI/FS report is a significant document, as it forms the basis for the selection of the remedy and the ROD/DD.

**Table 8-5 Recommended Feasibility Study Report Format**

Executive Summary
1. Introduction
1.1. Purpose and Organization of Report
1.2. Background Information (Summarized from RI Report)
1.2.1. Site Description
1.2.2. Site History
1.2.3. Nature and Extent of Contamination
1.2.4. Contaminant Fate and Transport
1.2.5. Baseline Risk Assessment
2. Identification and Screening of Technologies
2.1. Introduction
2.2. Remedial Action Objectives – Presents the development of RAOs for each media of interest (i.e., groundwater, surface water, soil, air, etc.). For each media, the following should be discussed:
2.2.1. Contaminants of concern
2.2.2. Allowable exposure based on risk assessment (including ARARs)
2.2.3. Development of remediation goals
2.3. General Response Actions – For each media of interest, describes the estimation of areas or volumes to which treatment, containment, or exposure technologies may be applied.
2.4. Identification and Screening of Technology Types and Process Options – For each medium of interest, describes:
2.4.1. Identification and Screening of Technologies
2.4.2. Evaluation of Technologies and Selection of Representative Technologies
3. Development and Screening of Alternatives
3.1. Development of Alternatives – Describes rationale for combination of technologies/media into alternatives. Note: This discussion may be by medium or for the site as a whole.
3.2. Screening of Alternatives (if conducted)
3.2.1. Introduction
3.2.2. Alternative 1
3.2.2.1. Description
3.2.2.2. Evaluation
3.2.3. Alternative 2
3.2.3.1. Description
3.2.3.2. Evaluation
3.2.4. Alternative 3
4. Detailed Analysis of Alternatives

**Table 8-5. Recommended Feasibility Study Report Format (Continued)**

4.1. Introduction
4.2. Analysis of Individual Alternatives Against the Nine NCP Criteria
4.2.1. Alternative 1
4.2.1.1. Description
4.2.1.2. Assessment
4.2.2. Alternative 2
4.2.2.1. Description
4.2.2.2. Assessment
4.2.3. Alternative 3
4.3. Comparative Analysis
Bibliography
Appendices
Source: <a href="#">Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA</a> (OSWER Directive 9355.3-01)



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## Chapter 9

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### Remedy Selection

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Remedy Selection is based on the comparison of remedial strategies and recommendations developed in the FS. During this step, the preferred alternative is identified and described in a PP. After review and comment by the public and stakeholders, the selected alternative is documented in a ROD or DD.

#### 9.1 Remedy Selection

The remedy selection step involves identifying a preferred response action strategy from those alternatives evaluated in the FS. The preferred alternative is based first on each alternative's ability to satisfy the threshold criteria (as identified in Table 8-4), and then on trade-offs among alternatives considering the primary balancing criteria. Further, results of the risk assessment need to be factored into the remedy selection step. The results of the BHHRA and BERA conducted during the RI serve as the primary means of supporting the selected remedy or documenting the NFA decision. The elements of remedy selection are presented in the following sections.

#### 9.2 Proposed Plan

The RPM, with the assistance and involvement of regulatory agencies and the installation, prepares a PP to identify the preferred alternative for the site (40 CFR Part 300.430(f)[2]). The PP briefly describes other remedial alternatives that were analyzed, and summarizes the information used to select the preferred alternative. A PP includes the following:

- Site background and characteristics, including nature and extent of site contamination;
- Site risks, including a summary of the results of the BHHRA, BERA, and the assumptions used in the analyses;
- RAOs, including what the proposed remedy is expected to accomplish;
- Summary and evaluation of alternatives, including options for attaining RAOs;
- Preferred alternative, including rationale for its selection and expectations for fulfillment of statutory and regulatory requirements; and
- Information on how the public can participate in the remedy selection process.

Any formal state regulatory comments on ARARs or alternative preference should be summarized in the PP. If waivers to ARARs are required, an explanation of the basis for the waivers should be included.

Upon completion of the PP, DON makes this document available at information repositories open to the public, and notifies the public and stakeholders of its availability and of the 30-day minimum public comment period. After that period, DON prepares a written summary of significant comments and any new relevant information submitted during the comment period, along with DON's response to each issue. This Responsiveness Summary is made available with the ROD/DD. DON also provides the opportunity for a public meeting on the PP at or near the site during the comment period. DON keeps a record of the meeting and makes it available to the public.

#### 9.3 Records of Decision and Other Decision Documents

The preferred alternative presented in the PP is formalized in a written DD. A DD contains the official statement of RA(s) required for a site and demonstrates that the response action chosen is consistent

with, and meets the requirements of, CERCLA and the NCP. Types of DDs include RODs, permit modifications, and UST decisions.

A ROD describes the remedy selection process and the remedy selected. It is the official term used by CERCLA and the NCP for the documentation of a final remedial response action decision at an NPL site. A ROD could also be used as the DD for non-NPL sites and is often used to document DON ERP decisions. The ROD or other DD must be signed before an RA is initiated.

#### **9.4 Preparation of the Record of Decision/Decision Document**

The RPM prepares a draft ROD/DD at the conclusion of a PP to support the selection of an RA at a site. The ROD/DD documents all facts, technical rationale, and site-specific policy determinations considered during the remedy selection process. This documentation is described in [A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents](#) (OSWER 9200 1-23P), and should be at a level of detail appropriate for the site situation and should be included in the AR. The documentation contained in the ROD/DD should identify the applicable legal authority for the response, describe the hazards and unacceptable risks necessitating the response, and summarize the evaluation criteria used during remedy selection. For petroleum sites where the NCP does not apply, state or local requirements for DDs may be followed, where they exist.

The ROD/DD should summarize the following information related to the scope and objectives of the action:

- Statement of the objectives of the selected response action, including, to the maximum extent possible, specific ER objectives (e.g., site-specific and appropriate residual concentrations for each COC);
- Evaluation of response alternatives and how the preferred alternative was selected;
- Explanation of how the selected remedy is protective of human health and the environment and how the remedy eliminates, reduces, or controls exposures to human and environmental receptors with the current and reasonably anticipated future land use;
- Identification of the federal and state ARARs that the remedy will attain;
- Identification of the ARARs or other federal and state laws that the remedy will not meet, any waivers invoked, and the justification for invoking the waiver;
- Description of how the remedy is cost-effective (i.e., provides overall effectiveness proportional to its cost);
- Explanation of how the remedy uses permanent solutions, alternative treatment solutions, and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and
- Whether the preference for remedies using treatment which permanently and significantly reduce the toxicity, mobility, or volume of the hazardous substances or pollutants or contaminants as a principal element is, or is not, satisfied by the selected remedy. If this preference is not satisfied, the ROD/DD shall explain why an RA involving such reductions in toxicity, mobility, or volume was not selected.

The ROD/DD also:

- Identifies regulator and community involvement in the response action;
- Explains how the nine NCP evaluation criteria were used to select the remedy;

- Indicates, as appropriate, the remediation goals that the remedy is expected to achieve as determined in the FS, the proposed or final (if available) locations for measurement of performance, and the methodology to attain these goals;
- Documents DON's attempt to restore natural resources (if the selected response action has an element that addresses NRI, or if a natural resources damage claim is filed against DON (see [DON Policy on Natural Resource Injury and Damages in the Installation Restoration Program](#));
- Addresses significant changes and the responses to comments received during review of the PP;
- Describes whether hazardous substances or pollutants or contaminants will remain at the site above levels allowing for UU/UE following the RA such that a review at least every five years would be required; and
- Provides, when appropriate, a commitment for further analysis and selection of long-term response measures within an appropriate timeframe.

## 9.5 Record of Decision Toolkit

In a joint initiative among EPA, DoD, and other stakeholders, a Streamlining Task Force was formed to address ways to reduce document size, review time, and number of revisions needed to document remedy selection at CERCLA sites. The committee chose to focus its initial efforts on streamlining RODs to minimize duplication of detailed information already documented in the AR that need not be replicated in the ROD. The first product of the Task Force, the [ROD Toolkit](#), is a supplemental resource to EPA ROD Guidance.

The ROD Toolkit provides RPMs with a resource for developing RODs using enhancement tools to clarify the connection between the CERCLA release and the selected remedy and to effectively convey information in a format that thoroughly yet concisely presents the full rationale for the remedy decision.

The ROD Toolkit acknowledges that the ROD is a defensible, stand-alone document that must memorialize the remedy decision in an appropriate level of detail following EPA ROD Guidance. Copying and pasting from previous documents can lead to extraneous information, the elimination of key elements and analyses that led to the selected remedy, and poor document flow. Detailed information from historical documents can be too detailed for direct inclusion in the ROD. Thus, reformulating the key facts from these documents and incorporating enhancement tools can result in a more succinct and understandable ROD. Summary graphics, figures, and tables, supported by text, must include sufficient data, analysis, and rationale to fully explain the remedy selection process in the ROD. Because there is no "one size fits all" template, it is critical during development of RODs to include the level of detail required by EPA ROD Guidance and balance the use of streamlining tools for better site-specific data presentation.

## 9.6 Flexible Record of Decision

The ROD is a legally-binding agreement between DON and regulatory agencies, and changing the ROD after it has been signed can be a complicated, costly, and time-consuming process. For this reason, the ROD should be carefully developed to allow flexibility in addressing unexpected issues without requiring changes to the document.

As discussed in Section 10.2.3, optimization during RA-O is a necessary element in ensuring effective remedy implementation. In many cases, the results of optimization reviews include recommended changes in the remedial approach. The goal of a flexible ROD, sometimes referred to as a "smart" ROD, is to allow modifications in the remedial approach to be implemented without the need to make changes to the ROD. These adjustments and modifications often are needed to address uncertainties and changing

site conditions that are typically encountered during implementation of a remedy as additional site and performance data are collected.

It is important that the language used in the remedy description allows for flexibility in technology transition and unit process selection. The wording used in the ROD should state what the preference is at the time given current site conditions, but recognize the potential need for a transition to other more cost-effective remedial options over time. The remedy description should also discuss the treatment train planned for remedial technologies, such as a transition from contaminant source area treatment to MNA for dissolved plume treatment. It also is important to document realistic performance objectives for the selected remedy components and the need for technology transition as further operation becomes no longer cost-effective, and to document an overall exit strategy for the site.

Additional information regarding the development of flexible RODs, including a checklist for optimizing ROD flexibility, is provided in Chapter 4 of DON [Guidance for Optimizing Remedy Evaluation, Selection, and Design](#) (UG-2087-ENV).

## **9.7 Record of Decision/Decision Document Approval Process**

The RPM shall provide the draft ROD/DD and a recommendation of action to the installation CO or BRAC PMO, as appropriate. If the CO/BRAC PMO do not concur with the recommendation or have questions concerning the ROD/DD, the issues should be presented to the RPM for resolution.

As a matter of being proactive, DON wants to work closely with the regulatory agencies and receive their concurrence on remedy selection decisions wherever possible. Having regulatory agencies sign the ROD/DD is one way of documenting their concurrence. Other means, such as letters or memoranda, are also acceptable means of documenting agency concurrence. However, regulatory agency concurrence on ROD/DDs is legally required only in a few instances. CERCLA §120(e)(4) states that where an FFA/Interagency Agreement is in place, both DON and EPA select the remedy. Under CERCLA §121(f)(3)(A), state concurrence is required only where the remedy does not attain an ARAR because the ARAR has been waived under §121(d)(4). Finally, a site's FFA/FFSRA/Interagency Agreement itself might require state concurrence.

RODs/DDs shall be signed (electronic signatures are acceptable) by the installation CO for active installations and the BRAC PMO delegate for BRAC installations. Following are options to address achieving regulatory concurrence:

- For NPL sites, RODs should include signature lines for the installation CO or BRAC PMO delegate and may contain concurrence signature lines for EPA and a state representative. If EPA and/or the state representative do not want to sign the ROD, they can provide separate letters of concurrence to the DON ROD; and
- For non-NPL sites, ROD/DDs should include signature lines for the installation CO or BRAC PMO delegate and may contain a concurrence signature line for the state representative (and EPA for some BRAC installations). If the state representative (and EPA for some BRAC installations) does not want to sign the ROD/DD, separate letters of concurrence can be provided to the DON ROD/DD.

For NPL sites, if DON and EPA do not concur on the selected remedy, the FFA outlines a detailed dispute resolution process to be followed in order to concur on the remedy selection. If the dispute cannot be resolved, EPA makes the final remedy selection decision. For non-NPL sites, DON has final decision authority. Some non-NPL sites also have dispute resolution processes in FFSRAs, with DON retaining final remedy selection authority. A notice of the decision and the availability of the ROD/DD should be publicized in accordance with public participation guidance.

For additional information on preparation of PPs, RODs, and other DDs, see [A Guide to Preparing Superfund Proposed Plans, Records of Decision, and other Remedy Selection Decision Documents](#) (OSWER 9200 1-23P).

### **9.8 Making Changes to the Record of Decision**

For sites subject to CERCLA, potential changes to RODs should be implemented through an Explanation of Significant Differences (ESD) or a ROD amendment. For minor changes, a memorandum to the RPM project file may be sufficient. An ESD documents a significant modification in cleanup goals or approach to those detailed in the original ROD, without change to the overall remedy. A ROD amendment documents a fundamental change in cleanup goals and/or approach to those detailed in the original ROD, including a change in the selected remedy. See [A Guide to Preparing Superfund Proposed Plans, Records of Decision, and other Remedy Selection Decision Documents](#) (OSWER 9200 1-23P).

An advantage of having a flexible ROD is to allow continual optimization to be performed without the need for a ROD modification. Should it be necessary to modify the ROD, it is important that efforts are made during the modification process to include the flexible ROD provisions. Changes to the remedy requiring modification of the ROD/DD shall be in accordance with subparts 300.430(f)(3)(ii) and 300.435(c)(2) of the NCP.

### **9.9 Making Changes to the Resource Conservation and Recovery Act Permit**

Similar to the ROD, the RCRA permit modification process can be quite onerous depending on the nature of the change and what class it falls into. Thus, the importance of having flexibility in the ROD applies equally to the RCRA permit. If a RCRA permit modification is necessary, it is important that efforts are made during the modification process to include flexible provisions.

Sites subject to RCRA requirements shall operate within the framework of a RCRA permit. Potential changes to the remedy may require a modification of the RCRA permit. The requirements to modify the permit depend on the extent of the change. Minor changes to system operation may only require a letter to the regulatory agency (Class I modification). More significant changes to system operation may require additional background and supporting documentation (Class II modification), or a complete permit reapplication (Class III modification). The three classes of RCRA permit modifications are described in further detail in 40 CFR Part 270.42.

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## Chapter 10

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### Remedial Design/Remedial Action

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The major activities of the RD/RA phases occur once the remedy selection has been documented in a ROD/DD. RD, RA-C and RA-O are the phases that lead to achieving the cleanup goals defined in the ROD/DD.

Response actions during the RD and RA phases include design and implementation of the selected RA. The RD and/or the RAWP should be site-specific and include the information from previous plans and procedures developed during the RI/FS. The following sections describe the key components of the RD and RA phases. EPA guidance for RD/RAs is located in the [Remedial Design/Remedial Action Handbook](#) (OSWER 9355.0.04B).

Remedy optimization during the RD/RA phases is required for DON sites in accordance with the [DERP Manual](#) and DON [Policy for Optimizing Remedial and Removal Actions at all DON Environmental Restoration Program Sites](#). The DERP Manual requires the DoD components to continually evaluate and improve ER remedies throughout the remedy lifecycle. The DON optimization policy outlines the requirements and processes for optimization during:

- Remedy Selection, Design, and Construction;
- Remedial Action Operation; and
- LTMgt.

Both the DERP Manual and the DON optimization policy require evaluation and implementation of GSR practices during environmental remediation. The DON optimization policy and GSR guidance documents provide information on incorporation of GSR practices as part of optimization during the RD/RA phases. DON optimization guides are available on the [NAVFAC ERB website](#). More detail on optimization can be found in the NAVFAC BMS.

#### 10.1 Remedial Design Phase

The purpose of the RD phase is to convert the conceptual design for the selected remedy from the FS into a full-scale detailed design for implementation. RD includes preparation of technical RD Work Plans, drawings, specifications, and RAWPs. The degree of detail conveyed by the task descriptions and technical drawings in the RD or RAWP should be adequate to implement the remedy.

Sometimes an RD and RAWP are developed separately and sometimes they are combined, depending on the nature and scope of the RA. The RAWP describes the RA, in particular how it will be staged and implemented, and also includes details on the implementation actions for LUCs if they are required at the site.

The RD and RAWP are considered by DoD and EPA as primary documents to help support the SC process and to eventually facilitate the NPL delisting process, if necessary.

Remedial system designs should incorporate flexibility to accommodate decreasing mass removal rate over time. The optimization of the RD/RAWP for a selected remedy should involve planning for a transition from higher- to lower-cost process options or technologies over the lifetime of the project. In the beginning, process options or technologies that can handle larger volumes of contaminated media or higher concentrations may be needed, but their use will likely become prohibitively expensive over time.



The selected process options or technologies should be designed for extended maximum efficiency over the complete duration or lifecycle of the project. Remediation systems are often designed for the “worst-case” initial conditions, resulting in high initial capital costs and potentially higher O&M costs due to increased energy demands and other factors. A proper life-cycle design results in a more sustained mass removal rate over time and typically, lower capital and total O&M costs in the long term.

Another important aspect of remedial optimization is the consideration and continual evaluation of site conditions, technological advances, and regulatory developments during the remedy selection and design phase. It is common for multiple years to pass between the FS and the completion of the RD. Because of this, RPMs must consider the development of the CSM as a continuously evolving process until RC or SC is achieved. Additionally, data from the RI/FS may not be (or may no longer be) accurate enough and better data may be necessary to delineate and characterize source areas to be treated with in situ technologies. A current literature search of proposed technologies may reveal advanced design concepts or technology limitations that were not well understood when the FS was developed. Further detail is provided in DON [Guidance for Optimizing Remedy Evaluation, Selection, and Design](#) (UG-2087-ENV). In addition, considerations should be given to implementing remedial footprint reduction approaches based on cost and benefits in terms of GSR metrics. Details about GSR metrics, footprint calculations tools, and footprint reduction methods are provided in DON [Guidance on Green and Sustainable Remediation](#).

DON has moved toward the design-build type of contract, which allows the design to evolve if necessary over the course of the project even after construction has commenced. Therefore, the frequency and level of internal design reviews are at the discretion of the RPM within the limits set forth in CERCLA or RCRA orders or permits. DON’s goal is to avoid prescriptive requirements that limit the range of options available to the remediation contractor. Typically, in a design-build scenario, the contractor is not required to provide detailed construction designs. However, the contractor should be required to submit detailed designs prepared by qualified, registered professionals for critical design features (e.g., geotechnical and structural) that may pose a significant risk to human safety, integrity and stability of existing or new structures, or the essential performance of the remedy. Such submittals should include a project-specific construction QAPP with QA/QC provisions for monitoring construction and for any field changes that may be necessary. If, during the RD phase, new information comes to light that would substantially alter the scope, cost, ease of implementation, or effectiveness of the previously selected RA, an ESD or amendment to the ROD/DD may be required.

Although EPA has not promulgated regulations that provide specific requirements for the plans developed during the RD phase of a CERCLA response, the following represent common elements of most RDs:

- RAOs;
- List of specifications for all equipment and materials required to implement the RA;
- Operational and optimization guidance for the remedy;
- Specific performance objectives that are linked with the remedy’s exit strategy;
- Cost estimate and proposed schedule (note that if a design-build contractor is being used, an additional cost estimate for the construction would not be required because it would already be included in the TO proposal or work plan);
- Project-specific construction QAPP including QA/QC provisions; and
- Implementation plans for LUCs (see Section 11.1).

EPA and state representatives review the RD/RAWP and provide comments, which the RPM should address. Actual construction of the remedy should begin only when comments have been sufficiently addressed.

Following the preparation of RD documents, the CIP prepared during RI/FS scoping should be reviewed and revised if necessary. After completion of the RD, the RPM shall issue a fact sheet to notify the media and public and, as appropriate, conduct a public briefing.

### **10.1.1 Permits and Approvals**

Permits, approvals, and site access agreements, if required, generally should be obtained during the RD phase. Cooperation between the RPM, the contractor, and the installation's legal, engineering, and public affairs staff is needed to secure the permits.

RAs that are conducted entirely on-site and in accordance with CERCLA §§104, 106, 120, 121 or 122, do not require federal, state, or local permits to engage in the remediation activity (CERCLA §121(e), as codified in 42 USC §9621(e)).

EPA's interpretation of CERCLA §121(e) waives the requirement to obtain a permit and associated administrative and procedural requirements of permits, but not the substantive provisions of permitting regulations that are ARARs. For off-site treatment or discharge of environmental media such as soil or process wastewater associated with a RA, permits may be required. For example, if contaminated soil is excavated and then hauled off-site for treatment and disposal, a RCRA generator identification may be required, along with manifesting of contaminated soil if it is hazardous waste under 40 CFR Part 261. Off-site treatment and disposal facilities must have all required permits. RPMs should consult their legal counsel and management before obtaining a permit. Subsequently, consultation with regulatory and permitting agencies may be necessary.

On-site remedial activities include the areal extent of contamination and all suitable areas in very close proximity to the contamination requiring the response action. RPMs are advised that under §121(d)(3) of CERCLA, wastes generated as a result of CERCLA remediation activities and transferred off-site shall be managed at a facility operating in compliance with federal laws. EPA requires off-site waste management facilities to fulfill EPA's definition of acceptability and has established detailed procedures for issuing and reviewing unacceptability determinations (see 40 CFR Part 300.400 for further details).

## **10.2 Remedial Action Phase**

Upon completion of the RD, implementation of the RA (the remedy selected in the ROD/DD) begins. Per CERCLA this date is required to begin no later than 15 months from the ROD signature date. The RA start date is defined as the date the contractor has mobilized and begun substantial and continuous physical on-site RA. The start date is important because it triggers the beginning of the five-year review cycle if one is required. The requirements for five-year reviews are discussed in Section 11.4.

The RA phase involves two main components, RA-C and RA-O. The RA involves the award of a contract or delivery order to a contractor to construct the selected remedy and implement the detailed design plans or performance specifications. The RPM and the acquisition team at the FEC should determine which type of contract is most appropriate for the site requirements. RA activities require close cooperation between the FEAD/ROICC, the RPM, and the installation. The RPM is the technical manager for the RA and is responsible for oversight functions such as coordinating with EPA, state, and local officials; maintaining the AR; participating in appropriate community involvement efforts; and ensuring overall QA/QC.

DON has various milestones for monitoring progress of RAs. The RIP milestone is achieved at the successful completion of the RA-C phase (i.e., completion of remedy construction and demonstration that

it is operating properly) and the RC milestone is achieved at the successful completion of the RA-O or in some cases the RA-C phase when cleanup goals have been met as specified in a ROD/DD. The SC milestone may be achieved if the remedy has accomplished the RAOs, and the site conditions allow for UU/UE of the property.

### **10.2.1 Remedial Action Construction**

RA-C is the period during which construction occurs to implement the remedy. During the RA-C, the contractor cleans up the site or builds and installs a remediation system, and demonstrates through written reports that the system is functioning as designed.

With any RA-C contract, normal construction industry practice is to conduct pre-final and final inspections prior to final government acceptance of the construction phase of the contract. These inspections should be conducted to confirm that the construction has been completed in accordance with the contract design and specifications.

During the pre-final inspection the TO COR, the contractor, and if necessary, the TPOC should inspect all elements of work to see if the work is complete and ready for acceptance under the terms of the contract. Some minor defects may come to light; if so the construction manager should develop a “punch list” of all items that need correction or completion before the work can be accepted. A pre-final inspection report is prepared that includes the punch list, completion dates for outstanding items, and a date for the final inspection.

If the RPM determines that punch list items are minor, the pre-final inspection may automatically serve as the final inspection. Otherwise, a final inspection is conducted later to determine that punch list items are corrected and all work has been completed in accordance with the contract plans and specifications. FFAs generally require a set of inspections to determine that all aspects of the remedy have been implemented in accordance with applicable enforcement documents and the ROD/DD.

For remedies requiring an RA-O phase, an Interim Remedial Action Completion Report (I-RACR) should be prepared at the completion of the RA-C phase. Section 10.3.1 provides a description of the I-RACR and the requirements for documentation.

### **10.2.2 Remedy in Place Milestone**

RIP is achieved when the construction of a long-term remedy is complete and the remedy is operating as planned to meet project RAOs in the future, or a short-term remedy has been successfully implemented and the final documentation is being prepared. The completion of the I-RACR documents the achievement of RIP and Operating Properly and Successfully (OPS).

If the remedy is expected to operate over an extended period to reach RAOs, once the construction is complete, the system is operating as designed and it is expected to meet RAOs, the RPM should document the RIP date in the NORM database. The determination of whether RIP has been achieved is a DON decision; therefore, regulatory concurrence for this milestone is not needed.

### **10.2.3 Remedial Action Operation**

Following the completion of the RA-C phase and the RIP milestone, the project may enter the RA-O phase. This phase involves O&M, monitoring actions, and continual optimization of the remediation system and site. If the remedy is accomplished (i.e., RC is achieved) by actions taken during RA-C, RA-O is not necessary.

During the RA-O phase, the remediation system is operated or chemical or biological processes are occurring leading to the cleanup objective identified in the ROD/DD. The RA-O phase may include

implementation and management/maintenance of LUCs. These LUCs must be defined as, or part of, the selected RA in the ROD/DD. The design and implementation plan for LUCs shall be included in the RD/RAWP. Therefore, no additional document should be necessary for the design or implementation of LUCs for the LTMgt phase. For sites where the existing RD/RAWP do not include LUC-specific information, documentation may be necessary for implementing LUCs during the LTMgt phase.

RA-O may include active remediation that requires an extended operation time to reduce contaminants to cleanup goals, such as remediation by air sparging/soil vapor extraction systems. RA-O may also include passive remediation technologies such as MNA. MNA requires an extended period of monitoring; however, this phase of monitoring is not considered LTM or LTMgt until cleanup goals are achieved. Therefore, MNA remains within the RA-O phase until cleanup goals have been achieved. Figure 10-1 outlines the main activities conducted during RA-O.

#### **10.2.3.1 Monitoring and Optimization during Remedial Action Operation**

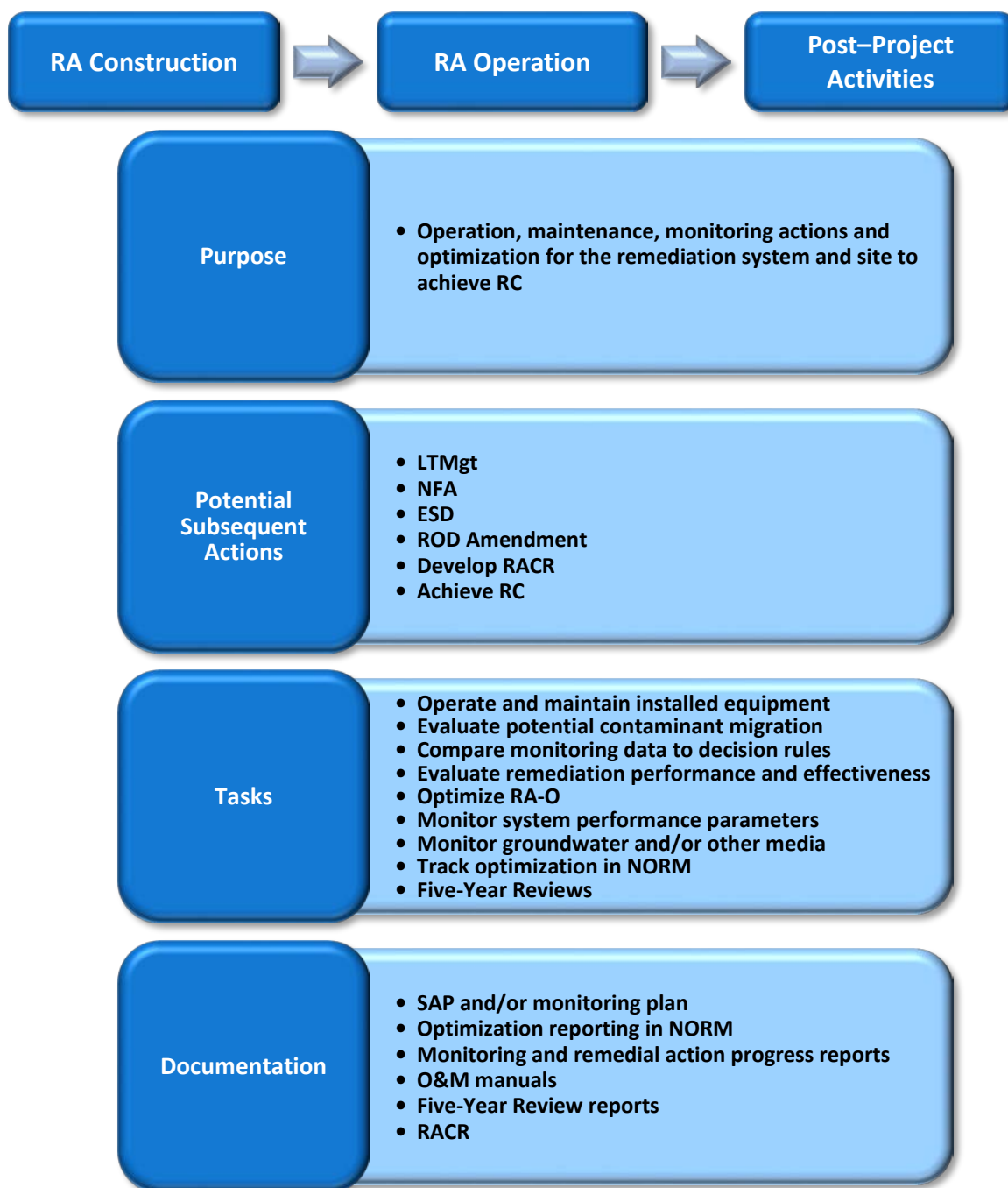
Monitoring conducted during RA-O should be primarily focused on collecting only the necessary data to measure performance objectives and to compare them to the exit strategy. Exit strategies are means of determining when it is time to stop, modify, or change a particular technology, or terminate all RAs, based on the achievement of previously established performance objectives.

Monitoring can have several other purposes as well, including:

- Evaluation of remedy performance and effectiveness;
- Protection of human health and the environment;
- Evaluation of contaminant migration; and
- Compliance with regulatory requirements.

A monitoring plan must be developed to clearly state all the goals of the monitoring program and the performance objectives of the RA-O and what specific data will be collected to satisfy those stated goals and objectives. Monitoring objectives must be developed that directly relate to the performance objectives of the RA, decision rules must be developed that directly support site management decisions, and the data that are to be collected according to the monitoring plan must support the decisions that will be made as the exit strategy is implemented.

RPMs must develop a SAP to detail the location, frequency, and type of samples to be collected and describe the analytical techniques, QA/QC requirements, and reporting protocol that will be used. A monitoring SAP ensures that logic is maintained by focusing data needs and data collection and analysis methods to directly support the monitoring objectives, decision rules, and subsequent management decisions. Further detail is provided in [Guidance for Monitoring at Hazardous Waste Sites: Framework for Monitoring Plan Development and Implementation](#) (OSWER 9355.4-28). For developing well-written annual reports during the RA-O phase, the [Management and Monitoring Approach](#) (MMA) may be used. This approach is particularly applicable for annual monitoring reports where significant amounts of data need to be included.



**Figure 10-1 Elements of Remedial Action Operation**

The DON [Policy for Optimizing Remedial and Removal Actions at all DON Environmental Restoration Program Sites](#) requires optimization evaluations for response action sites, implementation of the recommendations, and reporting of progress. Remedy effectiveness should be evaluated at least annually to ensure that it is efficiently making progress towards meeting project goals. Assessments include a review of the project goals, review and revision of the current CSM, evaluation of progress toward remediation goals, and evaluation of the remediation system and unit processes to ensure the appropriate technology (or combination of technologies) is being employed to reach cleanup goals.

DON [Guidance for Optimizing Remedial Action Operation \(RA-O\)](#) presents a stepwise process for optimizing RA-O projects. The objective of this guidance is to provide RPMs and their contractors with a process to maximize cost-effectiveness without compromising program and data quality. The steps detailed in the guidance are:

1. Review and evaluate RAOs;
2. Evaluate remediation effectiveness;
3. Evaluate cost-effectiveness and sustainability;
4. Identify potential remedy improvements and alternatives;
5. Develop and prioritize optimization recommendations and footprint reduction methods; and
6. Prepare an Optimization Report and implement the optimization recommendation.

An optimization evaluation usually is conducted during the RA-O phase to determine whether the existing remedy is making progress towards reaching cleanup goals and to recommend modifications or alternatives to enhance the performance of the remedy, reduce the operating costs, environmental footprint and cleanup time, or shut down the system if performance objectives have been met.

When monitoring to evaluate remedial performance, the data should also be used to make decisions to validate the current approach to remediation or to optimize the RA. For each site at which an optimization study is conducted, the RPM is required to track and report the following in the NORM optimization module:

- Baseline conditions;
- Recommendations of the study; and
- Implemented strategies.

In addition, DON optimization guidance recommends periodic third-party optimization reviews. Third-party optimization review teams should be comprised of experienced environmental professionals who are independent of the remediation project being reviewed. Team members should be hand-picked with site-specific characteristics and technical issues in mind. Teams may include individuals with expertise in innovative technologies for characterization and remediation, fate and transport of contaminants, remedial project management, total environmental cost control, environmental planning and analysis, and environmental cost-estimating. Team members normally are selected from DON, other federal agencies such as Army and USGS, academia, and the private sector. The FECs retain the final decision to implement recommendations of the third-party review teams.

DON [Guidance for Planning and Optimizing Monitoring Strategies](#) should be used by RPMs to ensure that their monitoring programs are designed and periodically optimized to cost-effectively support their monitoring goals without compromising program and data quality. The value in regularly evaluating monitoring data cannot be overstated. The data obtained from the monitoring program are the basis for assessing and optimizing remedy performance, including determining whether to shut off the system or terminate the RA-O phase, to change the monitoring program, or to consider another strategy. It is the RPM's responsibility to analyze monitoring data to determine the effectiveness of the response action and make good management decisions accordingly. The general strategies that ensure a cost-effective monitoring program include:

- Reducing the number of monitoring points;
- Selecting more appropriate monitoring points for remediation evaluation;

- Reducing monitoring duration and/or frequency;
- Simplifying analytical protocols;
- Ensuring efficient field procedures; and
- Streamlining data management and reporting.

It is also very important to ensure the right types of data from the right locations are being collected to assess remedy performance, and to support transition to the next phase of the treatment train.

DON [Guidance on Green and Sustainable Remediation](#) provides detailed information for implementing GSR considerations during all phases of the remediation process. For each site, specific GSR metrics need to be identified and tracked during the RA-O phase. Also, these metrics should be considered for evaluation of options identified during remedy optimization. The metrics commonly applied for remediation systems include GHG emissions, energy consumption, air pollutants, water consumption, community impacts, resources consumption, and ecological impacts. The DON GSR guidance also provides information on tools (e.g., SiteWise™) to calculate the remedy footprint, and to identify footprint reduction methods. The stepwise approach for implementing GSR consideration during RA-O and monitoring includes the following steps:

- Perform sustainability assessment of alternative (e.g., remedy modification/replacement, or monitoring strategy) recommended by the optimization review;
- Compare remedy performance and sustainability metrics for the existing and alternative systems;
- Evaluate potential footprint reduction methods based on performance and cost;
- Implement appropriate footprint reduction methods, if needed; and
- Track contaminant removal and GSR metrics.

DON policy on optimization, NAVFAC optimization guidance documents, case studies, and other vital resources for monitoring and optimizing the RA-O phase are presented on the DON [Optimization Workgroup](#) web page.

### **10.3 Response Complete Milestone**

The RA-O phase is complete when the selected remedy has achieved RAOs and cleanup goals specified in the ROD/DD. At that point, the RC milestone has been achieved and the site enters the LTMgt phase or achieves SC. It is very important that DON and federal and/or state regulators agree upfront on how monitoring data will be collected and analyzed to confirm that RC has been achieved. DON optimization guides are excellent resources to help RPMs develop performance objectives, monitoring plans, and exit strategies to effectively achieve RC. In particular, DON [Guidance for Optimizing Remedial Action Operation \(RA-O\)](#) provides guidance on the types of data required and how to visualize and analyze that data to evaluate the effectiveness of the remedy. This valuable information allows the RPM to identify appropriate sampling and analyses to confirm RC.

Formal documentation and concurrence for the RC milestone is essential to ensure that DON, EPA, and the state agree that cleanup goals have been achieved at the site. The Remedial Action Completion Report (RACR) formally documents the achievement of cleanup objectives, and is a comprehensive document that provides information about the site/OU, applicable ROD/DD, and cleanup activities carried out to achieve RAOs. Generally, a draft will be prepared for regulatory review and comment, and the final report will be issued after addressing those comments. Written concurrence from appropriate regulatory agency representatives are needed for RACRs.

The RACR signifies the achievement of the RC milestone, and the RC date shall be entered into NORM for reporting to NAVFAC HQ.

### 10.3.1 Remedial Action Completion Documentation

In 2004, DoD and EPA formed a task force to streamline the documentation requirements for SC and NPL deletion. The task force identified the required documents for DoD sites and issued the joint guidance [DoD/EPA Joint Guidance on Streamlined Site Closeout and NPL Deletion Process for DoD Facilities](#). The task force determined that there are two primary post ROD/DD documents required to be prepared by DoD. These documents are the RD/RAWP and three types of RACRs:

- I-RACR;
- RACR; and
- Final RACR.

DON [Guidance to Documenting Milestones throughout the Site Closeout Process](#) discusses the RACRs and other core documents required for SC. For RA requiring a prolonged RA-O phase to achieve RAOs, the RPM shall prepare an I-RACR following remedy construction and after evaluation has confirmed the remedy is operating as designed. Generally, RAs involving remediation of groundwater, including MNA, will require long-term operation during the RA-O phase, and an I-RACR should be prepared for these remedies. Depending on the project schedule, an I-RACR could be used to document completion of the RIP milestone, although it is not a prerequisite. The I-RACR could also be used for documenting OPS for remedies at BRAC or at non-BRAC installations where the sites may be available for property transfer or lease.

The RACR formally documents the achievement of cleanup objectives specified in the ROD/DD, at the completion of the RA-O phase or after construction where an RA-O phase is not required. In addition, it provides the basis for full or partial deletion from the NPL. The RACR also is used to document that the RC milestone has been attained. The RPM is required to obtain concurrence from regulatory agencies to achieve the RC milestone. Generally, a draft is prepared for EPA/state review and comments, and the final report is issued after addressing these comments. The concurrence could be in the form of a dated, official letter or email from the regulator of appropriate authority reflecting agreement and official sanction of the RC determination.

When all cleanup goals are complete at the last OU or site at an installation, the RACR for the last OU or site is designated the Final RACR. The Final RACR contains a brief summary of previous RACRs completed at the installation (in the Overview section of the report), as well as the RACR information for the last OU or site. The Final RACR also contains a brief summary of NFA RODs/DDs, if any, and provides references to the locations of previous RODs/DDs and RACRs. The RPM may include a table listing all of the OUs addressed at the installation and references to SC documents (letters, RODs/DDs, I-RACRs, RACRs, etc.). The Final RACR will require concurrence from the regulatory agencies. The Final RACR also contains all of the essential elements for EPA to begin the NPL deletion process with the Notice of Intent to Delete (NOID).

All RACRs should cross reference existing material and avoid duplicative language from other reports. RACR sections are listed in Table 10-1; the content outlined in this table helps ensure that Final RACRs contain all information needed for the NOID. For I-RACRs, which should follow the same outline as the RACR, EPA and the RPM determine whether and how the I-RACR Section D (Demonstration of Completion) and Section E (Ongoing Activities) are included.



**Table 10-1 I-RACR and RACR Outline**

<b>Section</b>	<b>Contents</b>
A. Overview	Provide a brief description of the OU characteristics, COCs, major findings, and results of site investigations. For the Final RACR, also summarize conclusions from previous I-RACRs and RACRs and identify their file location.
B. Remedial Action Objectives	Identify the RAOs and cleanup goals specified in the ROD/DD and subsequent modifications, if any.
C. Remedial Action	Briefly discuss the RAs taken to meet the RAOs.
D. Demonstration of Completion	Include information needed to demonstrate attainment of RAOs (e.g., final sampling report, visual inspection report). Modify this section for an I-RACR and include information about remedy construction and remedy operation as designed.
E. Ongoing Activities	Describe the activities, if any, still being performed or to be performed such as RA-O (this would only be included in an I-RACR) or LTMgt activities such as monitoring, five-year reviews, LUCs, etc.
F. Community Involvement	Briefly summarize the public outreach activities conducted at the site, (e.g., the CIP); specify the date the RAB was formed and terminated (if applicable); provide the dates of public meetings and discuss environmental justice initiative (if applicable).
G. Certification Statement	Provide a statement by a DON representative authorized to sign the ROD/DD, certifying that the RACR memorializes the completion of the RAOs. For an I-RACR, this certification will be for completion of construction and operation of the remedy in accordance with the ROD/DD.

### 10.3.2 Site Closeout Milestone at Remedial Action Completion

For sites not requiring LTMgt, completion of the SC milestone occurs concurrently with the RC milestone. SC can occur when the RC milestone has been achieved and environmental conditions at the site allow for UU/UE. This milestone signifies that DON has completed active management and monitoring at the site, the remedy is protective of human health and the environment, and that no additional environmental funds are expected to be expended at the site. In this case, the RACR also formally documents the achievement of the SC milestone.

In addition to the DON [Guidance to Documenting Milestones throughout the Site Closeout Process](#), the DoD/EPA Joint Guidance on Streamlined Site Closeout and NPL Deletion Process for DoD Facilities provides important information for documenting SC. The DON guidance provides more detailed information about the DON program, and therefore DON RPMs shall follow the DON guidance to ensure consistency within the DON ERP.

### 10.4 National Priorities List Delisting

The NCP establishes the criteria used by EPA to delete sites from the NPL. In accordance with 40 CFR Part 300.425(e), sites may be deleted from the NPL where no further response is appropriate. In making this determination, EPA considers, in consultation with the state, whether any of the following criteria have been met:

- Responsible parties or other persons have implemented all appropriate response actions required;

- All appropriate Superfund-financed response under CERCLA has been implemented, and no further response action by responsible parties is appropriate; or
- The RI has shown that the release poses no significant threat to public health or the environment and, therefore, taking of remedial measures is not appropriate.

Sites may not be deleted from the NPL until the state in which the site is located has concurred on the proposed deletion.

RACRs and the Final RACR are the supporting documents for NPL delisting of DON sites. RPMs provide EPA with all site RACRs, the Final Installation RACR, and any other documentation needed by EPA for delisting. EPA prepares any additional closeout reports and other documents for the delisting process. NCP §300.425(e)(4) sets forth requirements for site delisting to ensure public involvement in the decision. EPA is required to conduct the following activities:

- Publish a NOID in the FR and solicit comment through a public comment period of a minimum of 30 calendar days;
- Publish a notice of availability of the NOID in a major local newspaper of general circulation at or near the site;
- Place copies of information supporting the proposed deletion in the information repository at or near the site proposed for deletion; and
- Respond to each significant comment and any significant new data submitted during the comment period and include this response document in the final deletion package.

Upon completion of the public comment period, the EPA Regional Office will prepare a Responsiveness Summary, if necessary, to evaluate and address comments that were received. If none of the comments received during the comment period are dissenting, the site will be deleted from the NPL when EPA publishes the Final Rule.

NCP §300.425(e)(4) also requires that information supporting a proposed deletion be placed in the information repository. The information needed to support a deletion decision is included in the ROD/DD, RD/RAWP, RACRs, the NOID, public comments on the NOID, and documentation of state concurrence. No further information is required to support a delisting decision.

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## Chapter 11

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### Long-Term Management

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The LTMgt phase occurs after the RC milestone has been achieved at a site. This phase is required at sites where hazardous substances or pollutants or contaminants remain after RC, and are above levels that would allow UU/UE. This situation often arises when DON decides to implement remedies that are primarily containment-type remedies, or when DON remediates a site to a level that requires restricted land use (e.g., site remediated to levels only required for commercial or industrial use). Actions during this phase may involve LTM, implementation and/or management of LUCs, maintenance of a containment cap, and preparation of five-year review reports. Similar to the other DON ERP phases, NAVFAC provides ER,N or BRAC funds for the entire duration of the LTMgt phase.

#### 11.1 Land Use Controls during Long-Term Management Phase

DON sites requiring LTMgt are expected to have LUCs implemented. Management and maintenance of LUCs will be required. These LUCs must be defined as, or as part of, the selected RA in the ROD/DD. Implementation, management, and monitoring of these LUCs are ultimately the responsibility of the FEC or the BRAC PMO as long as the site remains funded under ER,N or BRAC. More detail on managing LUCs can be found in the NAVFAC BMS.

LUCs include engineering controls and institutional controls. Engineering controls are remedies to contain and/or reduce contamination, and/or physical barriers intended to limit access to property. Engineering controls may include fences, signs, guards, landfill caps, provision of potable water, slurry walls, sheet pile, and monitoring wells. Institutional controls include a variety of administrative and/or legal devices to maintain the viability and effectiveness of the selected remedy and any engineering controls. Institutional controls are imposed to ensure that the engineering controls stay in place, or where there are no engineering controls, to ensure a restriction on land use. Institutional controls include affirmative and negative easements, affirmative and restrictive covenants, equitable servitudes, notices (in deeds, newspapers, etc.), zoning, permits (such as construction, excavation, well drilling, etc.), agreements with regulators, and reporting on LUC maintenance.

At active DON installations, typical institutional controls at remediation sites may include restrictions on well drilling, soil excavation, and construction. During the LTMgt phase, these institutional controls may be implemented through installation master plans and/or requirements to obtain permits from the appropriate installation authority. Some active installations have the option of recording a “Notice of Inactive Hazardous Substance or Waste Disposal Site” at the county registrar of deeds to properly document the LUC. Institutional controls such as easements or covenants, commonly applied at privately-owned properties, are not available for active installations due to requirements from the General Services Administration that establishes regulations for managing United States property. However, these institutional controls (e.g., easements or covenants) should be applicable for BRAC and non-BRAC sites following property transfer. Transfer agreements for these properties should include details about implementing, monitoring, and reporting of LUCs at these sites.

When property is to be transferred to a non-federal entity at the completion of or during the LTMgt phase, the RPM, real estate manager, and legal counsel need to ensure all necessary LUCs are included as enforceable restrictions that run with the land in any deed or property transfer document executed to convey the property out of federal ownership. DON has the authority to impose restrictions on the transferee’s use of the property, and these restrictions are to remain viable and honored by all subsequent

owners. FECs should consult and work with the state and local government agencies to establish and enforce these restrictions.

Procedures for periodic inspections of LUCs are established in the RD or RAWP. Also, five-year reviews under CERCLA are required to include an assessment of the effectiveness of the LUCs.

The design and implementation plan for LUCs shall be included in the RD and RAWP. Therefore, no additional document should be necessary for the design or implementation of LUCs for the LTMgt phase. However, for sites where the existing RD or RAWP does not include LUC-specific information, documentation may be necessary for implementing LUCs during the LTMgt phase.

For additional information on LUCs, see DON [Policy Memorandum 99-02 Land Use Controls, Interim Final](#); [Policy on Land Use Controls Associated with Environmental Restoration Activities](#); and [Monitoring and Enforcement of Land Use Controls](#).

## **11.2 Land Use Controls Tracker**

LUC Tracker is a web-based management tool that operates as part of NIRIS to allow RPMs and FEC personnel to effectively manage their LUCs. RPMs are to use LUC Tracker for all sites where the selected remedy includes LUCs as required by [NAVFAC Implementation of the LUC Tracker](#) (5090 Ser 11009/ENC-RS). LUC information, reports, and maps shall be uploaded to the LUC Tracker, thereby allowing anyone in NAVFAC to run various queries to obtain specific LUC data for a site. LUC Tracker should also be used to automatically send reports to various stakeholders and can be used as an automated reminder system for upcoming inspections or reporting requirements. The LUC Tracker provides easy LUC data access for RPMs, efficient tracking of LUC integrity and compliance, and standard LUC data formats for interoperability among FECs and their contractors.

## **11.3 Long-Term Monitoring**

The LTMgt phase may involve LTM of groundwater, surface water, soil, sediment, vadose zone and/or landfill gases at DON sites. A site-specific plan including exit criteria is required for all LTM actions. Any applicable existing requirements for the state, RCRA, or other relevant programs shall be followed in developing the LTMgt Plan. In addition, optimization of LTMgt actions, including LTM, are required under DON [Policy for Optimizing Remedial and Removal Actions at all DON Environmental Restoration Program Sites](#).

At sites located in close proximity to buildings where VOCs exist in groundwater and soil, VI into the buildings may be a concern. If RC is achieved at such a site, but residual VOCs remain, VI sampling may be part of the LTM requirements. NAVFAC developed policy and guidance for VI monitoring and RPMs should consult the [NAVFAC ERB website](#) for the latest information.

Although groundwater is the most common media associated with LTM, other environmental media or site types are subject to LTM in order to ensure the remedy remains protective, including sediment monitoring, landfill and disposal site gas monitoring, and ecological resources monitoring. RPMs are strongly encouraged to consult the NAVFAC ERB website for the latest guidance and policy related to these and other issues related to LTM on DON ERP sites. DON [Guidance for Planning and Optimizing Monitoring Strategies](#) (NAVFAC UG-2081-ENV Rev. 1) includes two parts: Part 1 addresses general information for optimizing monitoring for various media and site types, and Part II addresses media-specific optimizing information for the following topics: groundwater, sediments, groundwater discharge to surface water, ecological resources, vadose zone, landfills, LUCs, and VI.

At DON sites requiring groundwater monitoring in the LTMgt phase, the monitoring program is often a carryover from a previous phase such as the RA-O phase. Because objectives may change in the transition

from RA-O to LTMgt, this program requires updating and optimization to focus on the objectives of the LTMgt phase. DON [Guidance for Planning and Optimizing Monitoring Strategies](#) should be followed for developing and optimizing groundwater monitoring plans. This guidance focuses on the most significant ways to design and optimize groundwater monitoring programs to maximize cost-effectiveness without compromising program and data quality. RPMs should also consult the NAVFAC ERB website for NAVFAC guidance on optimizing LTMgt.

Similar to the RA-O phase, annual reports during the LTMgt phase may be prepared in accordance with the MMA. This approach is particularly applicable where significant amounts of groundwater monitoring data need to be included. The MMA template and examples are available on the [NAVFAC ERB website](#).

GSR considerations similar to those discussed for the RA-O phase are applicable during the LTMgt phase, particularly for LTM actions. See the DON [Guidance on Green and Sustainable Remediation](#) for details about GSR metrics, footprint calculation tools, and footprint reduction approaches.

### 11.3.1 Monitoring Plan

The goals of the monitoring program should be clearly defined and focused on the LTMgt actions and then documented in a monitoring plan. The monitoring plan should focus on the *minimal* level of monitoring necessary to be protective of human health and the environment. All monitoring activities must have a relevant and validated purpose towards demonstrating protectiveness. Monitoring for reasons that cannot be clearly linked with site requirements represent a waste of resources for DON. The primary purpose of a monitoring plan is to specify how the monitoring program will be conducted to meet the site-specific objectives. It allows for consistent data collection and comparability and documents the monitoring approach. The following components should be included in a monitoring plan:

- Statement of program goals;
- Description of the current monitoring network;
- Frequency and planned duration of monitoring;
- Specific field procedures (e.g., purging, sampling, decontamination, recordkeeping, etc.);
- Analytical methods, sample handling requirements (e.g., containers, preservation), and QA/QC sample collection rates;
- Data management and reporting procedures;
- Decision criteria (including exit strategies) and review process to periodically optimize all of the above; and
- Any other requirements (e.g., RCRA monitoring).

Implementation of a well-designed monitoring program greatly facilitates future optimization of the monitoring strategy at a site.

### 11.3.2 Monitoring Optimization

DON [Guidance for Planning and Optimizing Monitoring Strategies](#) provides detailed information and procedures to evaluate the performance of monitoring programs and to optimize the program to meet stated objectives. A systematic process should be followed for optimizing monitoring programs. The optimization process focuses on collecting relevant data of the appropriate quality to achieve program

*Every monitoring well in the program should have a specific purpose.*

goals. The general strategies that ensure a cost-effective monitoring program include:

- **Program goals and CSM:** During the LTMgt phase, typical goals of monitoring programs include monitoring protectiveness of the remedy, and meeting regulatory requirements such as landfill monitoring. The monitoring program needs to clearly define monitoring objectives. The CSM should be used to determine these objectives, and should be updated as new monitoring data become available;
- **Location of monitoring points:** An important step in designing or optimizing a monitoring program is to identify monitoring points that provide the right amount of coverage in the right locations. For example, at a groundwater site every monitoring well in the program should have a specific purpose;
- **Frequency and duration of monitoring:** Monitoring frequency and duration of the monitoring program, including decision criteria, should be evaluated to determine optimal monitoring frequency. Time series data plots for each monitoring well are a basic tool to assist in determining monitoring frequency;
- **Analyte list and QA/QC samples:** Tailoring the data collection and QA practices to the goals of the monitoring program ensures that data management and reporting are limited to the data required for program goals. Excessive data not only require extra cost for data collection, but also confound data review, management, and reporting;
- **Sampling procedures:** Techniques to improve sample quality and representativeness while decreasing sampling costs should be explored for optimization; and
- **Data evaluation, management, and reporting procedures:** Statistical and geostatistical tools are available to assist in spatial and temporal data analysis. These tools can greatly assist in optimizing a monitoring program. Similarly, data management tools such as GIS can assist in data visualization and trend analysis. Program optimization also may include report streamlining to focus on relevant information.

#### 11.4 Five-Year Reviews

In accordance with CERCLA §121(c), a five-year review is required if an RA is selected that results in hazardous substances or pollutants or contaminants remaining at levels that do not allow for UU/UE. For example, if the site is restricted to industrial use, or a containment remedy is in place at the site, five-year reviews will need to be conducted. If an RA results in UU/UE but will not achieve RC within five years, a five-year review is required during the RA-O phase and until UU/UE is achieved. The purpose of the five-year review is to evaluate the performance of the implemented remedy and to verify that the remedy remains protective of human health and the environment, as stated in the ROD/DD. The existing remedy should be modified if it is no longer protective of human health and the environment.

The [Navy/Marine Corps Policy for Conducting CERCLA Five-Year Reviews](#) (5090 N453 Ser/11U158119) provides important information for RPMs to plan and conduct five-year reviews. A realistic schedule shall be prepared to ensure the statutory deadline for the five-year review is met. Generally this is at least a twelve month effort. RPMs shall budget and execute five-year reviews at active and BRAC installations for as long as five-year reviews are required. The DON policy includes guidance for five-year reviews for properties transferred under BRAC and non-BRAC programs and should be followed for all five-year reviews.

Although DON policy requires continual evaluation and optimization of remedies, RPMs must take advantage of opportunities presented by the five-year review process to discover, recommend, and

implement optimization strategies for all ongoing RA-O projects. RODs and DDs shall be prepared and negotiated to specifically and explicitly include opportunities for optimization and the flexibility to implement process improvements.

#### **11.4.1 “Trigger” Date for Five-Year Review**

The start of the five-year review is triggered by the on-site mobilization date for sites/OU's that require an RA-C phase. For remedies that do not require an RA-C phase (e.g., MNA or institutional controls), the remedy start date and trigger date is the ROD/DD signature date. The implementation of an interim RA or a removal action at a site does not trigger the requirement of five-year reviews. Only implementation (by mobilization for action or by signature, as appropriate) of a ROD/DD triggers the five-year review requirements. A five-year review and report for a site are to be completed and signed within five years of the trigger date for that site. Subsequent five-year reviews shall be signed no later than five years after the signature date of the previous five-year review report. DON policy recommends allowing a minimum of one year to complete a five-year review and obtain necessary signatures by the statutory deadline.

#### **11.4.2 Five-Year Review Technical Assessment**

The five-year review is expected to determine if the remedy is functioning as intended to protect human health and the environment. RPMs should review the available optimization data or study findings to determine the effectiveness of the remediation system. For sites where the remediation system is not making adequate progress, the five-year review report should recommend necessary actions. However, the DON should not reopen remedy selection decisions contained in the ROD/DD unless the protectiveness of the remedy is in question. The DON five-year review policy provides detailed information for determining protectiveness of remedies, and addresses important issues such as new ARARs, ECs, and changes in site risks.

#### **11.4.3 Five-Year Review Report**

The five-year review report should present a brief description of the site, the site or OU's five-year review protectiveness determinations, and issues and recommendations that affect protectiveness. This report should consider and/or contain the following:

- Clearly state whether the remedy currently is or is expected to be protective;
- Document any deficiencies identified during the review that affect protectiveness;
- Recommend specific actions to ensure that a remedy will be or will continue to be protective;
- Where necessary, include a description of follow-up actions needed to achieve or to continue to ensure protectiveness, and a timetable for those actions;
- For sites in the RA-O phase for which detailed remedy evaluation and optimization are performed routinely, relevant information for the five-year review report should be readily available;
- In conducting a five-year review, the effect of any newly promulgated or modified standards on the protectiveness of the remedy originally selected in the ROD/DD should be determined;
- When the five-year review indicates that the remedy is not performing as designed, the report should recommend actions to improve performance;
- Where a site is in the RA-O phase, a five-year review shall confirm that immediate threats have been addressed and that the remedy will be protective when complete;



- The five-year review should NOT include sites that are currently under investigation, in RD or are undergoing RA-C, or sites that have previously obtained NFA status or have no RA-O/LTMgt component; and
- Only one five-year review report is required per installation per review cycle. When additional sites become eligible for five-year reviews, these sites need to be rolled into the existing five-year review cycle. This means that the initial five-year review for additional sites will almost always occur sooner than five years.

#### **11.4.4 Protectiveness Statements**

A protectiveness statement shall be generated for each site/OU that has a ROD in place or RA has been initiated and the site has not achieved UU/UE. For installations where construction is complete, also issue one installation-wide protectiveness statement covering all remedies that do not allow for UU/UE. Model protectiveness statements are found in the EPA [Comprehensive Five-Year Review Guidance](#).

To assess the protectiveness of the remedy, human health risk, ecological risk, and the overall performance of the selected remedy must be evaluated. The assessment is conducted by answering three questions:

- Is the remedy functioning as intended by the decision documents?
- Are the exposure assumptions, toxicity data, cleanup goals, and RAOs used at the time of the remedy selection still valid?
- Has any other information come to light that could call into question the protectiveness of the remedy?

The following information needs to be considered:

- The performance standards (e.g., cleanup goals, plume containment, pumping rates) are or will likely be met;
- Existing problems with the remedy that could ultimately lead to the remedy not being protective or suggest protectiveness is at risk (e.g., shrubs or bushes growing on a landfill cap that was designed to have a grass vegetative cover, extent of plume not fully delineated);
- Access controls (e.g., fencing, security guards) and institutional controls needed at the particular stage of the remediation are in place and prevent exposure;
- Other actions (e.g., removals) necessary to ensure that there are no exposure pathways that could result in unacceptable risks have been implemented;
- Maintenance activities (e.g., pumping and treating, monitoring slurry walls, mowing cap), as implemented, will maintain the effectiveness of response actions;
- There are changes in standards identified as ARARs in the ROD, newly promulgated standards, and/or changes in To Be Considered criteria identified in the ROD, that could call into question the protectiveness of the remedy;
- There are changes in land use or the anticipated land use on or near the site;
- New human health or ecological exposure pathways or receptors have been identified;
- New contaminants or contaminant sources have been identified;
- There are unanticipated toxic byproducts of the remedy not previously addressed by the decision documents;

- There are changes in the physical site conditions; and
- There are changes in the toxicity factors for contaminants of concern.

There are some cases where protectiveness may need to be deferred. For example, if new information reveals the extent of waste and contamination is greater than previously defined and there is a potential for uncontrolled exposure, then a deferred protectiveness statement may be warranted. If protectiveness is deferred, include a milestone date to complete the further evaluation and five-year review addendum. Per DON Policy, the addendum must be completed within one year, unless an alternate timeline is approved by NAVFAC HQ.

#### **11.4.5 Review and Signature**

In accordance with EO 12580, and Environmental Restoration Program (DoDI 4715.7), DON is the approval authority for CERCLA five-year reviews at DON sites. For active installations, the five-year report is signed by the installation CO or their designated representative. For installations closed under BRAC, the five-year review report is signed by the BEC; for non-BRAC closed installations, the report is signed by the CO of the supporting FEC or a designated representative.

### **11.5 Site Closeout Milestone at End of Long-Term Management**

SC signifies that DON has completed active management and monitoring at a site, the remedy is protective of human health and the environment, and no additional DON funds are expected to be expended at the site. Completion of the LTMgt phase demonstrates that SC has been achieved. To document this completion, a RACR Amendment may need to be prepared, in accordance with DON [Guidance to Documenting Milestones throughout the Site Closeout Process](#).

An OU or site under LTMgt will not achieve SC as long as contaminants remain above levels that would allow UU/UE. Achieving these levels, particularly for sites with containment remedies, may require a long period of time, with the OU/site remaining in the LTMgt phase for the entire period. As an example, for landfill cap sites, groundwater monitoring requirements for the LTMgt phase may be 30 years or longer, with LUCs maintained if contaminants remain in place above action levels. Typically, five-year reviews are needed for this entire duration. These reviews are to be conducted in accordance with [Navy/Marine Corps Policy for Conducting CERCLA Five-Year Reviews](#).

A RACR Amendment documents the completion of all LTMgt actions, and thus the SC milestone is achieved when a RACR Amendment report is complete. The report should include a brief discussion of previous reports such as a RACR that documented completion of the RAs to achieve RC that preceded the LTMgt phase, and the five-year review report(s) prepared during the LTMgt phase.

A RACR Amendment signifies completion of all actions under the ROD/DD. DON shall obtain concurrence from regulatory agencies for this report, and inform the public of its availability. A copy of the report along with supporting documents should be available in the RPM's site files (SFs).

RPMs should consult DON information sources and websites (such as the NAVFAC ERB website) for the latest policies and guidance on RACRs and RACR Amendments.

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## Chapter 12

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### Munitions Response Program

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MR actions undertaken at an MRS seek to identify and respond to MEC, MPPEH, and MC that present a threat to human health and the environment. An MRS is defined as a discrete location that is known to require a MR. MEC is defined as UXO, DMM, and MC present in high enough concentrations to pose an explosive hazard. MC in lower concentrations is not considered MEC. MPPEH is defined as material that, prior to determination of its explosives safety status, potentially contains explosives or munitions (e.g., munitions containers and packaging material; munitions debris remaining after munitions use, demilitarization, or disposal; and range-related debris); or potentially contains a high enough concentration of explosives such that the material presents an explosive hazard (e.g., equipment, drainage systems, holding tanks, piping, or ventilation ducts that were associated with munitions production, demilitarization, or disposal operations). MRs which are cleanup actions funded by the ER,N or BRAC are referred to as being part of the MRP.

This chapter provides RPMs with basic information, resources, and tools to properly execute and manage a MR project. It also outlines any specific differences between a MR and a cleanup undertaken as part of the traditional IRP, which was addressed in previous chapters. Appendix A provides a list of references RPMs can consult when conducting a MR action. Appendix A contains policy and guidance for the MRP, as well as technical references for explosives safety requirements.

This chapter does not address chemical warfare material (CWM), either contained in munitions or in a chemical agent identification set. RPMs that encounter CWM should immediately contact NOSSA for a Navy site or MARCORSYSCOM for a Marine Corps site. NOSSA or MARCORSYSCOM will assist RPMs in contacting the U.S. Army's Non-Stockpile Chemical Materiel Program Office, Aberdeen Proving Ground, Maryland. OSD policy established a recovered CWM program with the Department of the Army as the Executive Agent.

#### **12.1 DON Munitions Response Program Site Inventory and Program Goals**

The DON has conducted comprehensive surveys to establish a baseline inventory of sites that may require a MR. These surveys collected information on "other than operational ranges" which includes closed, transferred, and transferring ranges, and other sites (e.g., disposal sites) that potentially contain MEC/MPPEH and/or MC. DON used the inventory data to develop the inventory of sites to be included in the MRP.

The inventory is shared with public stakeholders and regulators to help ensure that MRSs are identified for inclusion in the program. Each year the inventory is reviewed and updated to include any recently identified MRSs. Sites were typically added to the inventory when the PA or SI was performed, but they can sometimes be identified through ground intrusive construction activities when MEC/MPPEH is found. Additionally, operational ranges that are determined to no longer be required for operational use and are officially closed are eligible for inclusion in the program.

##### **12.1.1 Lines of Evidence for Unlimited Use / Unrestricted Exposure**

MRP sites, unlike IRP sites have generally been approached with the viewpoint that UU/UE is either impossible or impractical. RPMs should consider at the earliest juncture of the MRP investigation process if UU/UE is possible and incorporate that determination into investigation and remediation plans. Recent

developments with Advanced Geophysical Classification may mitigate uncertainty factors that have prevented UU/UE as a viable outcome.

To support a potential UU/UE end-state, RPMs should use a weight of evidence approach which would consider multiple lines of evidence as support. Example lines of evidence would typically involve comprehensive knowledge of munitions type/ penetration depths, land use/changes, and erosion/deposition patterns. If the RPM is able to establish to the stakeholders that they can define what MEC is present at a site, at what depths it could be found, and the detection equipment can differentiate MEC from scrap to the required depth, it is logical that the site should be a suitable candidate for a UU/UE remedy. This determination will not be feasible for all sites, and should be considered in balance with the costs to implement an up-front remedy against LTM costs. When UU/UE is not achieved at a MR site, generally LTM will be required in perpetuity as explosive hazards from munitions remain for extended timeframes. Implementation of a UU/UE remedy does not necessarily preclude the ability to provide a deed notice or other warning instrument, so long as there are not restrictions on the remediated parcel.

## **12.2 Explosives or Munitions Emergency Response Actions**

An explosives or munitions emergency response by a military EOD team to a site may be the first indication that it has the potential to become an MRS. An explosives or munitions emergency response typically begins with the discovery of a MEC/MPPEH item at a project site where they were not known or suspected to be present. When a MEC/MPPEH item is first encountered at a site, the project manager (RPM for ER sites) must stop all operations which have the potential to put personnel, equipment, and/or property at risk, and then request an explosives or munitions emergency response from the cognizant EOD unit in coordination with appropriate installation personnel (PWO or explosive safety officer). If cognizant EOD unit information is unknown, the Explosives Safety Review, Oversight, and Verification of Munitions Responses (NOSSA Instruction [NOSSAINST] 8020.15 [series] or MC 8020.10 for Marine Corps) includes unit contact information. NOSSAINST 8020.15 (series) can be downloaded from the [NOSSA website](#) (registration required) or requested by calling NOSSA or MARCORSYSCOM.

Emergency responses may occur outside of ER sites (e.g., MILCON). The eligibility requirements outlined in Table 4-2 are used to determine whether the location or responsibility to respond will become part of the DON ERP.

Within one week of first encountering MEC/MPPEH, the project manager (RPM for ER sites) must also notify NOSSA or MARCORSYSCOM using NOSSAINST 8020.15 (series) Enclosure (1), "Munitions Response Site Identification and Notification Report". NOSSA or MARCORSYSCOM will acknowledge receipt of the report by e-mail within two weeks of receipt. Depending on the circumstances involved, NOSSA or MARCORSYSCOM will either concur with a resumption of operations or require the project manager to prepare and obtain approval of an Explosives Safety Submission Determination Request (ESS DR) or ESS before operations can resume.

If NOSSA or MARCORSYSCOM determines that an ESS is required, the RPM shall take necessary action to get the MRS identified in NORM. Once so identified, EOD should generally not be requested to respond again. RPMs should plan and execute actions utilizing appropriate contractor resources to conduct responses to MEC/MPPEH. An emergency response by an EOD team would only be appropriate if the UXO contractor encounters a munitions item which is beyond their capability to safely manage.

## **12.3 Munitions Response Actions**

Because the MRP is implemented under the DERP, the response actions follow the CERCLA response process as described in the NCP and previous chapters of this Manual. MR actions are normally

categorized into investigations, removal actions, and RAs, based on the severity of the safety hazard, level of detail, and scope.

MR actions typically begin by conducting a PA/SI. Data collected during the PA/SI determine the scope of the RI and the suitable level of response action (i.e., removal action or RA) and/or the immediacy of the response (i.e., emergency, time-critical, or non-time critical).

### **12.3.1 Explosives Safety**

The DDESB provides oversight of the development, manufacture, testing, maintenance, demilitarization, handling, transportation, and storage of explosives (including CWM) on DoD facilities worldwide. The DDESB ensures that safety is maintained during the conduct of response actions under DDESB authority (10 USC, §172) where MEC/MPPEH are involved and by adhering to the requirements of DoD ammunitions and explosives safety standards presented in [Ammunition and Explosives Safety Standards](#) (DoD 6055.09-M). To comply with DDESB requirements, the Navy and Marine Corps work through NOSSA or MARCORSYSCOM respectively, to obtain approval from DDESB for MR activities.

The Navy and Marine Corps implement the DoD's explosives standards primarily through three publications

- NAVSEA Ordnance Pamphlet 5 (OP 5), Vol. 1, 7th Rev., Ammunition and Explosives Ashore, Safety Regulations for Handling, Storing, Production, Renovation, and Shipping;
- NOSSAINST 8020.15 (series) Explosives Safety Review, Oversight, and Verification of Munitions Responses; and
- [MCO 8020.10](#) Marine Corps Explosives Safety Management Program.

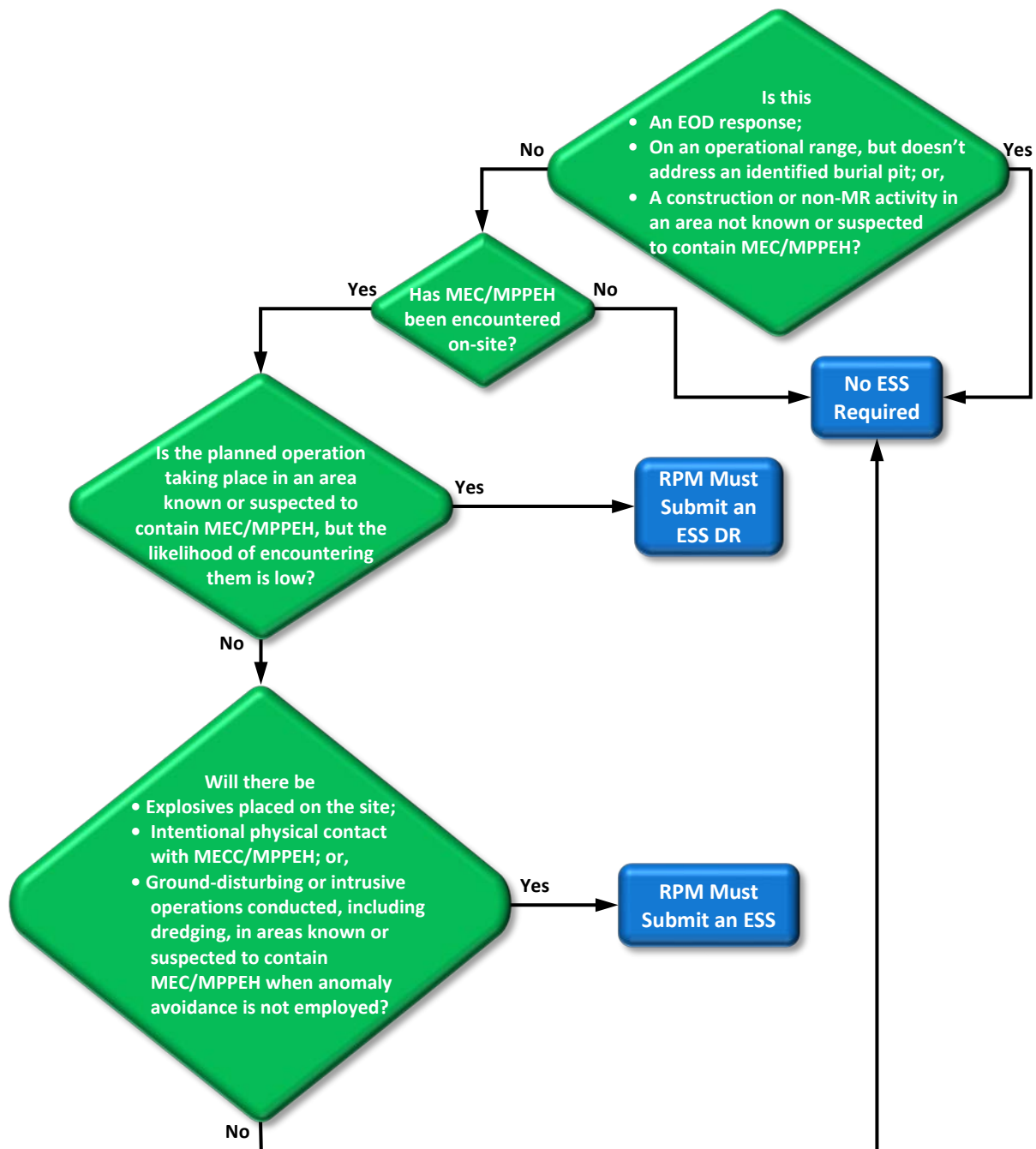
NAVSEA OP 5 Section 13-15 addresses MPPEH and OP 5 Chapter 14 addresses response actions involving known or suspected explosive hazards. Like NOSSAINST 8020.15 (series), NAVSEA OP 5 can be downloaded from <http://www.navsea.navy.mil/Home/NOSSA.aspx> or can be requested by contacting NOSSA.

#### **12.3.1.1 Explosives Safety Submission**

When a site is known to contain MEC/MPPEH or after a MEC/MPPEH item is discovered in an area where the item was not known or suspected to be present, the RPM shall submit NOSSAINST 8020.15 (series) Enclosure (1), "Munitions Response Site Identification and Notification Report". The RPM has several options depending on what MEC/MPPEH is present or anticipated to be present, and what work is planned. All of these options involve working with NOSSA or MARCORSYSCOM to address explosives safety concerns and may require an ESS, a document required by NAVSEA OP 5 (Volume 1), and DoD 6055.09-M (Volume 7).

The ESS shall be submitted to NOSSA (N4) or MARCORSYSCOM and approved by the DDESB prior to the initiation of any MR activities that involve placement of explosives, intentional physical contact with MEC/MPPEH, or conducting ground-disturbing or other intrusive activities, in areas known or suspected to contain MEC/MPPEH. The ESS addresses the explosives safety aspects of a MR including, but not limited to, site location, response techniques, the munition with the greatest fragmentation distance, explosives safety arcs or exclusion zones, site conditions, and other pertinent information. The ESS is independent of the site HASP, and addresses only those hazards posed by MEC/MPPEH. For the Navy, all ESS requests shall be submitted to NOSSA via the NOSSA WebESS tool or to MARCORSYSCOM via the Marine Ammunition Knowledge Enterprise tool.

The decision to prepare or not prepare an ESS is shown in Figure 12-1. More detail is also provided in the following paragraphs and in NOSSAINST 8020.15 (series) or MCO 8020.10.



**Figure 12-1 ESS Decision Flowchart**

The ESS is completed in accordance with NOSSA INST 8020.15 (series), Enclosure (3) “Guide for Preparing an Explosives Safety Submission” or MCO 8020.10. The final version of the ESS must be signed by the cognizant RPM, Explosives Safety Officer, and Public Works Officer, as appropriate for the site. Since an ESS is a complex document, RPMs must ensure their project schedules include adequate time for ESS preparation, review, endorsement, and approval. Note that draft ESSs that do not conform with NOSSA

guidance will require revision and resubmission to NOSSA or MARCORSYSCOM which will result in project delays. This schedule needs to be clearly articulated with the entire project team, including regulatory agencies and other stakeholders. In addition to reviewing and endorsing ESSs, NOSSA and MARCORSYSCOM should also be considered valuable resources to the project team. RPMs are encouraged to engage them early in the project planning process so that operational options, new technologies, and all aspects of explosives safety are considered.

An approved ESS from NOSSA or MARCORSYSCOM and DDESB is required for:

- MRS investigation or characterization that involves intentional physical contact with MEC/MPPEH;
- A determination of NFA with regard to MEC/MPPEH and MC;
- Any removal actions involving MEC/MPPEH;
- Construction support where the probability of encountering MEC/MPPEH is determined to be moderate or high; and
- Execution of the selected MR.

An ESS is not required for:

- Munitions or explosives emergency responses;
- PA/SI activities when intentional physical contact with MEC/MPPEH, or ground-disturbing activity is not intended;
- Maintenance and clearance activities on operational ranges; or
- MRs on former ranges used exclusively for training with small arms ammunition. However, the responsible project manager must document that munitions containing high explosive fillers were not used on the range and request that NOSSA or MARCORSYSCOM determine that an ESS is not required. This is done using NOSSAINST 8020.15 (series), Enclosure (2B) "Small Arms Range No Further Action Explosives Safety Submission Determination Request" or MCO 8020.10.

NOSSA or MARCORSYSCOM may determine that an ESS is not required for operations taking place in an area known or suspected to contain MEC/MPPEH when the likelihood of encountering them is low. Examples of such operations include:

- On-call construction support or on-site construction support when included as a conservative measure;
- Ground-disturbing activities on former ranges used exclusively for testing or training with small arms ammunition; and
- Anomaly avoidance techniques employed in support of vegetation reduction operations, cultural/natural resources survey, PA site reconnaissance, the SI, sign or fence installation, or similar activities not involving intentional physical contact with MEC/MPPEH.

To obtain NOSSA (Navy installations) or MARCORSYSCOM (Marine Corps installations) determination that an ESS is not required, the responsible project manager must complete and fax, e-mail, or mail NOSSAINST 8020.15 (series) Enclosure (2A), "Explosives Safety Submission Determination Request". Information provided will allow NOSSA or MARCORSYSCOM to evaluate the site-specific conditions and the risk or hazard. NOSSA or MARCORSYSCOM will concur or not concur in writing. In order to meet operational time constraints, this concurrence/non-concurrence may take the form of a fax or e-mail. The responsible



project manager shall contact NOSSA (N4) or MARCORSYSCOM if there is any uncertainty regarding whether the ESS is required.

An ESS contains information obtained from sources which, while unclassified, are sensitive. These sources carry the following distribution statement, warning, and destruction notice:

**DISTRIBUTION STATEMENT C**

**Distribution authorized to U.S. Government agencies and their contractors; administrative/operational use; 15 January 2001. Other requests for this document must be referred to the Naval Ordnance Safety and Security Activity (NOSSA) (N5).**

**WARNING**

**This document contains technical data that is subject to the Arms Export Control Act, 22 USC Sec. 2751 et. seq. and is protected from release by 10 USC Sec. 130. Violations of these laws are subject to severe criminal penalties.**

**DESTRUCTION NOTICE**

**Destroy by any method that will prevent disclosure of contents or reconstruction of the document.**

The Final ESS may be included as a tab or appendix of the work plan or QAPP. Whether or not the ESS is included in the work plan or QAPP, these stand-alone documents must incorporate all specified explosives safety requirements from the ESS, and the ESS must be maintained at the project site. Restricted material must be redacted from these documents if they are provided to any personnel (e.g., state regulator) who do not meet the distribution requirements, or are included in the AR. Until approved by the DDESB, an ESS is a working document and is not authorized for release outside of the DON and their contractors. After DDESB approval, distribution is authorized to U.S. Government agencies and their contractors for administrative and operational use only.

**12.3.1.2 Health and Safety Requirements**

NAVSEA OP 5 requires that every means possible be used to protect personnel and the general public from exposure to the hazards associated with MEC/MPPEH-contaminated real property currently or formerly under DON ownership or control. Such real property includes manufacturing areas, firing and impact ranges, and waste collection or treatment/disposal areas such as pads, pits, basins, ponds, streams, and burial sites.

Protective means taken by the RPM and the UXO contractor include:

- Obtaining NOSSA or MARCORSYSCOM and DDESB approval of the ESS;
- Taking MR actions using the most appropriate technology to ensure protection of the public consistent with the proposed end use of the property, consistent with federal, state, and DoD directives and coordinated with appropriate DoD agencies;
- Planning and providing for, and knowing, the measures to be taken in the event of an accident or incident involving MEC/MPPEH;
- Identifying and requiring training and personnel qualifications for all MRS workers; and
- Ensuring that only material that has had its explosives safety status determined is permitted to leave the MRS.

The following general explosives safety rules shall be followed by the UXO technicians executing the approved ESS and work plan:

- Do not allow unauthorized or non-essential personnel to be exposed to MEC/MPPEH;
- Assume all MEC/MPPEH contains a live charge until it can be determined otherwise;
- Consider MEC/MPPEH that has been exposed to fire or detonation to be extremely hazardous;
- Do not move any MEC/MPPEH item until qualified personnel have determined it is safe to move; and
- Carefully examine all MEC/MPPEH for markings and other identifying features.

RPMs can request that NMCPHC review contractor HASPs.

DON requires that standard operating procedures (SOPs) be developed and adhered to for all operations involving ammunition or explosives, including MR actions. SOPs developed for MR projects must meet the substantive requirements of Standard Operating Procedures Development, Implementation, and Maintenance for Ammunition and Explosives (NOSSAINST 8023.11A) or MCO 8020.10. This includes the requirement that each SOP be included in the approved work plan and that persons using the SOP be certified as having been trained in its use.

### **12.3.2 Munitions Response Detection Technologies**

Detection technologies generally fall into two categories, analog and digital. Analog methods rely on the operator to manually observe, interpret, and report instrument output. Analog methods are susceptible to multiple points of error, and are difficult to QA/QC. Analog methods should only be used when no other viable alternative exists (e.g., surface sweep during site preparation or steep/inaccessible slopes). Digital methods utilize geo-referenced recording techniques that rely on automated systems for observation, interpretation, and reporting of instrument output. QA/QC of digital methods lends itself to generation of transparent and traceable data products which can be compared to established standards of quality.

The selection of the most appropriate MEC/MPPEH detection technology for conducting a MR action requires careful consideration for two reasons: (1) there is not a currently accepted “best” tool that offers a high degree of effectiveness, ease of implementation, and cost-effectiveness in every situation; and (2) the “best” detector in one geological, topographical, oceanographic, and vegetative environment may not work well in a different environment.

The accepted methodology for verifying that the selected munitions detection technology works in a particular MRS is to design and construct an Instrument Verification Strip (IVS) and then daily run the instruments over the IVS to verify that the field crews and equipment are performing satisfactorily. The seeded IVS and the adjacent noise strip will determine the extent to which there is naturally-occurring background noise and also determine the selected instrument’s ability to detect buried MEC surrogates or Industry Standard Objects at the MRS. RPMs should refer to DoD ESTCP [Geophysical System Verification \(GSV\): A Physics-Based Alternative to Geophysical Prove-Outs for Munitions Response](#) for more information on system verification.

Regardless of the technology used to detect MEC/MPPEH, all of the current terrestrial detection technologies have difficulty distinguishing between MEC/MPPEH and non-munitions materials, such as scrap metal. Research into munitions classification technology has been conducted for several years by the DoD’s SERDP and ESTCP to address this technical challenge. The classification technology can distinguish between a target of interest (TOI) and a non-TOI under the right environmental settings and is discussed later in this chapter.

MEC/MPPEH detection technology is used to perform the following three distinct types of detection operations:

- **Surface Sweep Operations:** A systematic search of a specific area using a handheld instrument in real time to detect and locate surface/proud (i.e., lying exposed on the ocean floor) MEC/MPPEH, in order to prepare for sub-surface operations;
- **Digital (Sub-Surface) Mapping Operations:** A terrestrial system collects geo-referenced digital geophysical mapping (DGM) data over a specific area and processes that data to aid in boundary determination and footprint reduction, and to identify and report the locations of subsurface anomalies for later reacquisition, excavation, and removal action. Underwater mapping operations may use another type of sensor (sonar, magnetometer, etc.) to generate the digital map of anomalies or proud items; and
- **Reacquisition Operations:** A terrestrial anomaly reacquisition operation locates subsurface anomalies previously detected through sweep or DGM operations in support of excavation and removal. Underwater reacquisition operations may locate targets that were previously identified in support of identification, monitoring, excavation, and removal.

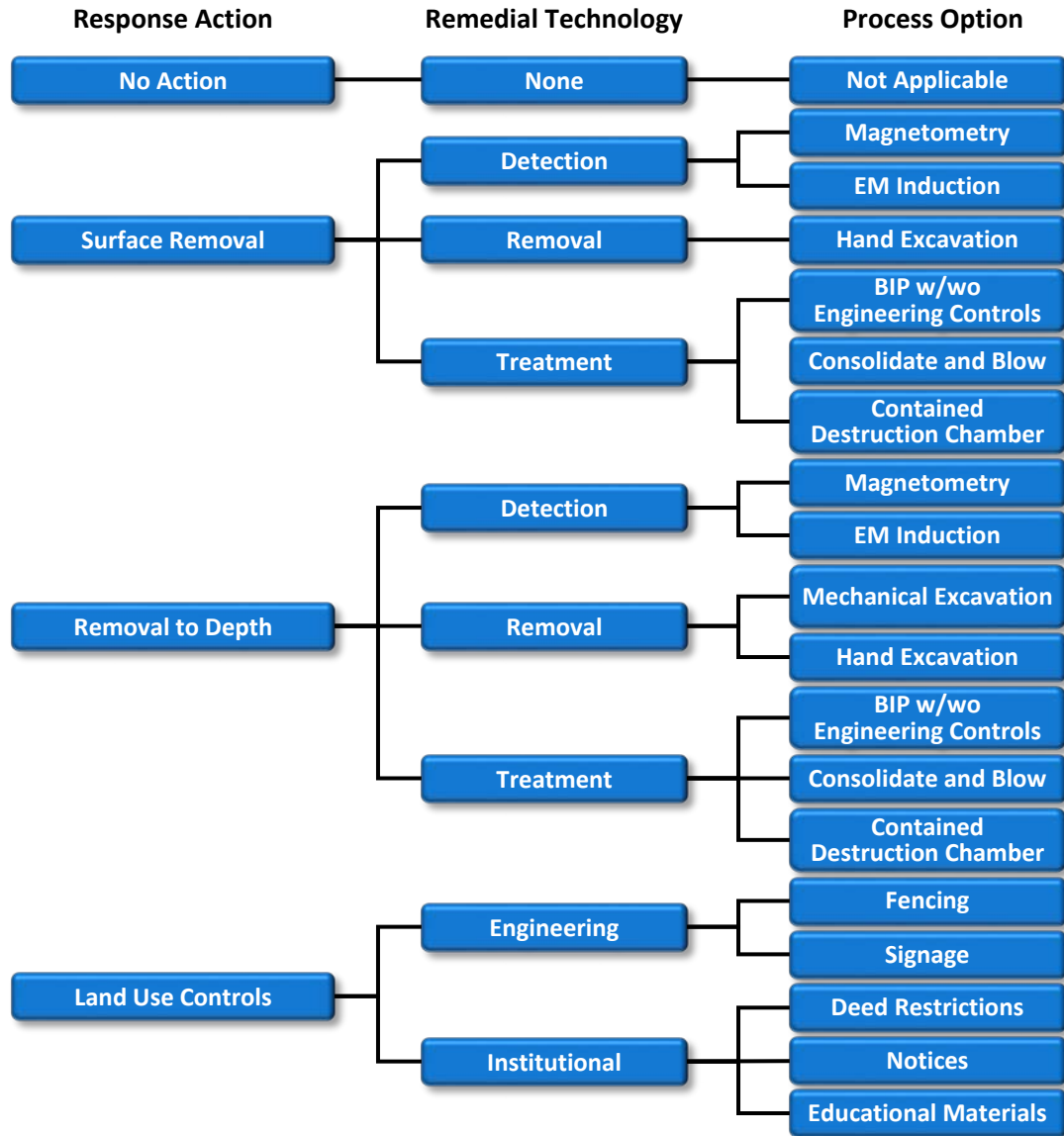
Terrestrial detector technology is available in a broad range of commercially-available instruments and, depending on the type of MRS operation, is deployed in many different configurations ranging from manually-operated handheld systems to complex multi-sensor towed arrays and airborne platforms. Figure 12-2 shows the common detection technologies and remedial technologies process options applicable to terrestrial MRSs.

A terrestrial or underwater detection system for either surface sweep, DGM, or reacquisition operations is composed of four main elements:

- Sensor (geophysical, sonar, visual/optical, etc.);
- Sensor platform;
- Positioning and navigation system; and
- Data-processing system.

The geophysical sensor is generally the main focus in terrestrial detection systems, but other elements are also critical to the success of the overall system. The survey platform deploys the geophysical sensor and not only governs the terrain in which the system can be operated, but is also a major factor in sensor performance. The positioning equipment determines the geophysical sensor's geographic location at each data point recording during the survey. The navigation system ensures that the correct area is surveyed and complete coverage is achieved. The data-processing system ultimately determines how data are handled and how targets are selected and interpreted.

Many geophysical sensors will operate in either analog or digital mode. In analog mode, the sensors produce an audible output, a meter deflection, and/or numeric output which are interpreted by the instrument operator, generally in real time. Digital geophysical sensors are instruments that digitally record geophysical measurements where the recorded data can be geo-referenced (positioned) to where each measurement occurred. Digital geophysical data are post-processed for interpretation and QC.



**Figure 12-2 Terrestrial Munitions Response Site Remedial Technologies and Process Options**

Two main sensor technologies are used for anomaly detection on terrestrial sites:

- **Electromagnetic Induction (EMI):** An active sensor that induces electrical currents in nearby conductive objects. The electrical currents generate a secondary magnetic field that is measured to detect both ferrous and non-ferrous items. A common example of a handheld EMI sensor is the metal detector used to locate coins buried at the beach; and
- **Magnetometer:** A passive sensor that measures changes in the magnetic field. Ferrous items create irregularities in the Earth's magnetic field and may contain remnant magnetic fields of their own that are detected by magnetometers. Magnetometers can only detect ferrous metal items. They cannot detect non-ferrous items such as aluminum or brass.

#### **12.3.2.1 Advanced Geophysical Classification**

Following a decade of RDT&E, advanced geophysical classification technology has been successfully demonstrated on several live sites under the DoD's ESTCP. New classifiers using complex algorithms process geophysical data to classify subsurface anomalies as those likely to be a TOI which must be removed or a non-TOI which can be left in the ground. Using these advanced classification-capable EMI sensors to analyze data over previously-detected anomalies has shown that it is possible to correctly identify 75 to 90 percent of clutter while retaining all the TOI on the dig list. More information on the classification technology can be found at [www.serdp-estcp.org](http://www.serdp-estcp.org) and from the guidance document [Implementing Advanced Classification on Munitions Response Sites: A Guide to Informed Decision Making for Project Managers, Regulators, and Contractors](#). To ensure data quality, the DoD has established the DoD Advanced Geophysical Classification Accreditation Program to accredit organizations that use advanced classification at MRSs. It is required to use an accredited contractor to perform this type of work. Implementation of classification technology on an MRS project would be most effective if performed for a remedial or removal action.

#### **12.3.2.2 Sensor Platforms**

Various platforms are used to deploy the geophysical sensors to survey terrestrial areas. There are five basic classes or types:

- Handheld;
- Man portable;
- Cart mounted;
- Towed array; and
- Airborne.

For deploying geophysical sensors in a marine environment, the most common platform types are:

- Man-portable (diver or wading if explosives safety requirements can be met);
- Remotely operated vehicles;
- Autonomous underwater vehicles; and
- Vessels with or without hull-mounted or towed systems.

The choice of sensor platform is dictated by the type of detection operation, the type of sensor deployed, and the site to be surveyed. Accessibility is a significant consideration in selecting a sensor platform. Site features such as terrain, vegetation, oceanographic conditions, accessibility, and the overall size of the survey site will influence sensor platform design and are often the deciding factors in selecting equipment. Demonstration of effective sensor performance is also a critical factor for the MRS area to be investigated. Stand-off distances for underwater detectors are generally larger than for terrestrial detectors; however the signal strengths at the added distances may be too low to be reliably detected, especially for smaller munitions. Incorrect choices in sensor/platform application can result in a false 'no find' condition, which could lead to the leaving of a munitions hazard in place at a site.

#### **12.3.2.3 Positioning Equipment**

A positioning technology is needed in digital mapping to produce any type of representation or map of the Earth's surface or subsurface. Positioning technologies determine the sensor's geographic location at each data point recorded. From this information, a map of the sensor response and a record of the travel

pathways can be produced. Accuracy, effects of topography, tree canopy, line of sight, ease of use, and costs are generally the most significant criteria for technology selection.

Locations can be determined by many different techniques of varying sophistication. Traditional surveying techniques may use tapes and trigonometry to determine relative positions from known ground points. Highly accurate optical laser-based measuring equipment can provide centimeter accuracy in a continuous tracking mode in areas where line of sight is not obstructed by trees or other objects. Other techniques rely on various applications of differential global positioning systems (DGPSs); ultrasonic, radio ranging; and inertial navigation systems. Sonar-based systems include ultra-short baseline and long baseline. Inclinerometers can also be used on tow cables for underwater systems. In more advanced systems, positioning technologies are directly integrated with the sensors to provide a digital output that can be directly merged with sensor readings for creation of a site map.

#### **12.3.2.4 Navigation System**

The navigation system guides the system operator over the area of interest to be mapped. Traditionally, the operator has navigated using visual aids, such as lines or cones set out in regular patterns. With the advent of towed-array and airborne mapping systems, advanced navigation systems based on geo-location technologies, such as DGPS, have been developed. These systems provide real-time guidance and feedback that indicates whether a preplanned course is being correctly followed. Navigation systems can also provide real-time feedback on data quality and coverage, allowing coverage errors and data gaps to be corrected in the field.

The major components of a navigation system are the geo-location receiver (i.e., DGPS), navigation computer, and navigation aids. Towed-array navigation system guidance errors of less than half the survey line spacing are needed for efficient field mapping of most full-coverage surveys. However, greater accuracy may be needed at sites with tighter DQOs.

#### **12.3.2.5 Geophysical System Validation**

Prior to using a geophysical system (e.g., sensor, platform, positioning and data processing) at an MRS, the system must be demonstrated to the standard prescribed in the project work documents. The Navy uses geophysical system verification (GSV) for geophysical system validation. The GSV process is a rigorous, physics-based verification approach for determining that a geophysical system is operating properly, as well as allowing the ongoing monitoring of production work.

The GSV process consists of performing daily checks of both the geophysical sensor equipment and of background conditions. Geophysical sensor equipment checks are performed using an IVS and the background conditions checks are performed using a noise strip. A production blind seeding program is also required to verify system performance during geophysical surveying. Blind seeding is a powerful process monitoring tool that can serve to increase regulator and stakeholder confidence to a high enough level that post-remediation QC activities such as verification sampling may not be necessary. Blind seeding tests and validates the geophysical detection process.

Underwater GSV presents added challenges as compared to a terrestrial site. Consideration should be provided for the dynamic nature of the underwater environment, and limitations on precision positioning for underwater platforms. Design and use of underwater GSV needs to account for these factors.

#### **12.3.2.6 Digital Data Processing**

For DGM surveys, digital sensor data are recorded in the field by a data-acquisition system (i.e., a data logger or computer) and are typically processed and analyzed after the survey is completed. Computer and analytical software systems are available to assist with processing geophysical survey data, producing

maps demonstrating the data, and interpreting the data to determine if anomalies that warrant further investigation exist. Qualified and experienced personnel and processing procedures are critical to producing accurate data and meaningful results. Demonstrated experience, especially when using the newer munitions classification technologies, has been shown to be critical to successful performance.

For more information on detection technologies, see one or more of the following sources:

- [DoD ESTCP](#);
- [NAVFAC Munitions Response Sites Portal](#);
- [ITRC UXO Documents](#); and
- [EPA Military Munitions and UXO website](#).

#### **12.3.2.7 Underwater Detection Technologies**

The primary types of anomaly detection technologies available for use at underwater MRSs include sonar, electro-optical, laser line scanner, and magnetometer/EMI. Compared to terrestrial technologies which are fairly mature, underwater detection is considered evolving. Based on the state of underwater technology, most underwater RI efforts are planned to occur following terrestrial RIs. It is important to note that the types of sonar used for investigation of underwater MRSs do not adversely impact marine mammals that rely on echolocation. Equipment and techniques equivalent to terrestrial Advanced Geophysical Classification technology have not yet been applied for use at underwater MRSs but are under active development via electromagnetic and sonar technologies. Figure 12-3 provides a list of common detection and remedial technologies process options applicable to underwater MRSs.

#### **12.3.3 Munitions Response Removal and Treatment Technologies**

Removal and remedial options for an MRS can be broken down into some basic response actions including: no action; surface/proud item removal; subsurface removal; and use controls (e.g., LUCs for a terrestrial site). Surface and subsurface removal involve the use of the detection equipment (discussed in the previous section), along with a method to remove and treat the MEC/MPPEH.

Removal technologies are used to allow recovery of any MEC/MPPEH or to provide accessibility for treatment of the MEC/MPPEH. Because every MRS is unique, removal operations are also unique, often posing different challenges that must be addressed based on the expected munitions to be encountered and a site's physical characteristics and conditions.

For terrestrial sites, the following removal technologies are used:

- Hand excavation;
- Mechanized excavation;
- Mass excavation and screening;
- Magnetically assisted recovery; and
- Remotely-operated removal equipment.

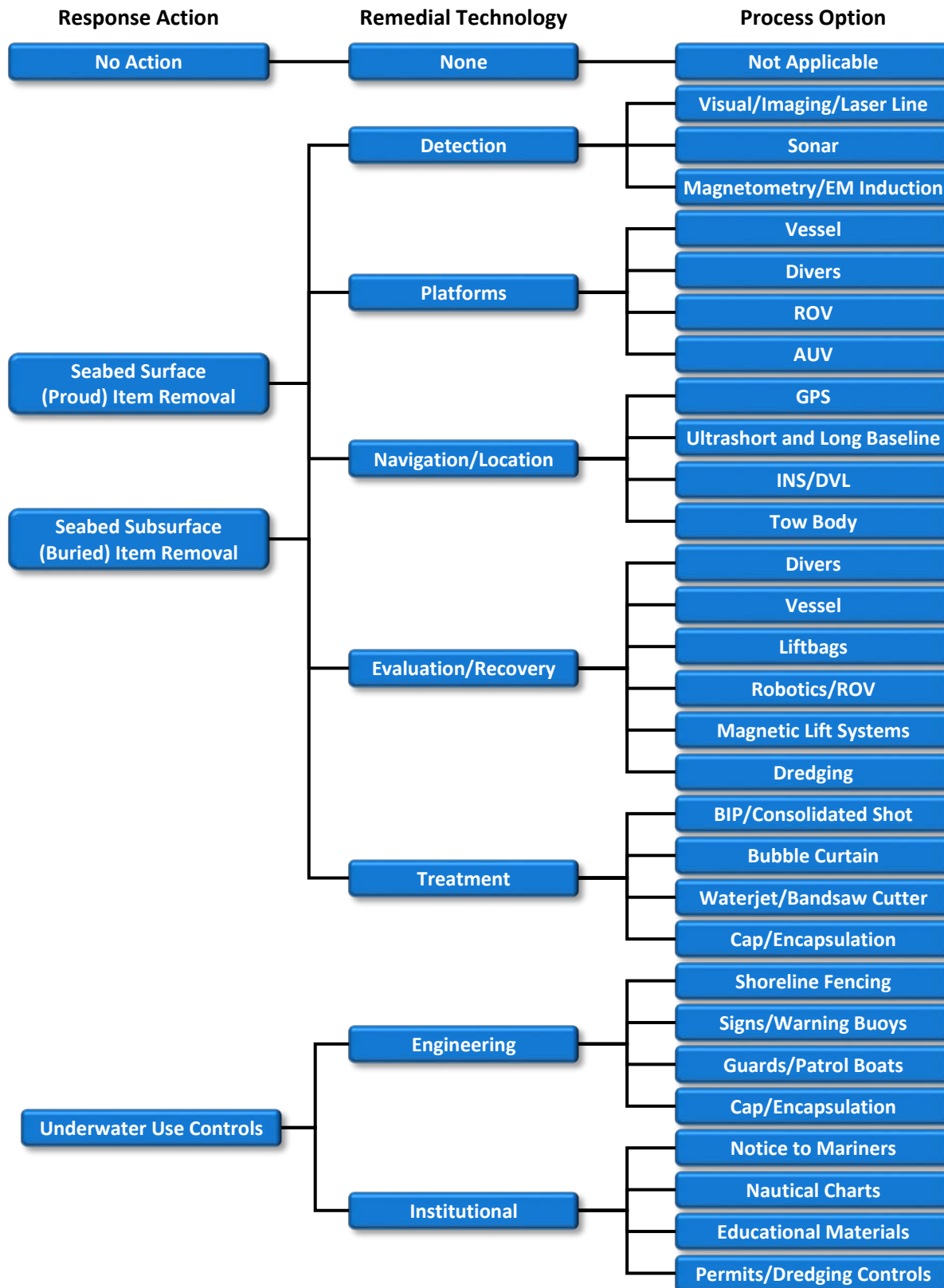


Figure 12-3 Underwater Munitions Response Site Remedial Technologies and Process Options



For underwater sites, the following removal technologies are used:

- Hand excavation (using water jets or airlifts);
- Lift bags and baskets;
- Robotics/remotely operated vehicles;
- Magnetic lift systems; and
- Dredging and screening.

Conducting underwater munitions removal operations using these technologies is significantly more expensive than similar operations on land. Efficiency in the rate of production is decreased in comparison to terrestrial operations along with an increased potential to leave MEC/MPPEH items behind.

Selection of an underwater removal technology is highly dependent on a combination of the number, type, configuration, and condition of the munitions and the site physical characteristics and conditions. While one removal technology may be the simplest and most versatile method to use based on the site's physical characteristics and conditions, it may not be very effective based on the condition of the munitions. Not only do these characteristics and conditions drive the site-specific operational requirements for selection of a recovery technology, but they also impact safety considerations for people and the environment.

During munitions recovery operations, an exclusion zone is established to prevent non-essential personnel from entering the site. Recovered material is classified by qualified UXO technicians as being either munitions-related or non-munitions related. If it is classified as being munitions-related, it is then further classified as MEC/MPPEH, material documented as an explosive hazard, or material documented as safe.

#### **12.3.3.1 Treatment Technologies**

Treatment technologies are used to treat/destroy the MEC/MPPEH. Destruction options for MEC/MPPEH at terrestrial sites do not have the same level of complex issues or concerns that underwater sites pose.

For terrestrial sites, the following treatment technologies are typically used:

- Blow in place (BIP);
- Consolidated detonation;
- Contained detonation chambers;
- Encapsulation and capping; and
- Permitted open burn/open detonation treatment, storage, disposal facility.

For underwater sites, the following treatment technologies are typically used:

- BIP;
- BIP with bubble curtain;
- BIP with low order;
- Consolidated detonation ashore/afloat; and
- Encapsulation and capping.

MEC/MPPEH must be guarded and secured once found. Munitions identified as not safe to move must be destroyed in place by performing a BIP. Munitions identified as safe to move can be either destroyed by consolidating the MEC to a designated detonation location or with MEC that are not safe to be moved. Munitions that are safe to move can also be placed in temporary storage for a regularly scheduled disposal operation. It is generally preferred to manage the MEC on-site, since off-site treatment exposes additional personnel to the hazard through the shipping process and is costly.

The hazards associated with a BIP operation include overpressure (i.e., shockwaves) and blasting effects (i.e., noise). The hazards associated with performing an underwater BIP have unique effects that must be managed differently than when performing a BIP on land. These effects can sometimes be mitigated by planning appropriate exclusion zones to keep workers (i.e., divers) at a safe distance or through the use of engineering controls such as bubble curtains and blast mats. Both of these engineering controls are meant to mitigate sound pressure levels, blast overpressure, and fragmentation of the MEC. In planning for these mitigation measures, protection of marine life and the sympathetic detonation, or the detonation of other nearby MEC, should also be considered. More information on the selecting, planning, and considerations for use of specific removal technologies can be found in the NAVFAC MRP RI/FS Guidance.

#### **12.3.3.2 Land Use Controls**

LUCs are used primarily to manage risk during implementation of a remedy, as well as residual risk after completion of a remedy. Unless a UU/UE remedy has been implemented, some form of LUC is typically required at an MRS to account for residual hazards from undetected MEC/MPPEH even if an active removal or treatment is conducted. LUCs can be applied at both terrestrial and underwater sites in the form of physical controls (i.e., engineering controls) and legal/administrative controls (i.e., institutional controls).

The cost and feasibility of possible site end states (UU/UE or LUCs) must be considered early in the process, particularly for underwater MRSs. The remedy for an MRS should focus on the best action that minimizes total life-cycle costs.

#### **12.3.4 Preliminary Assessment**

The PA for an MRS serves the same purpose as a PA for an IR site. Conducting a PA under the MRP is consistent with the IR process.

The objective of the PA for an MRS is to:

- Review existing information;
- Conduct on-site reconnaissance, if appropriate;
- Determine if a release requires additional investigation or action to eliminate from further consideration those areas that pose no threat to public health or the environment;
- Prioritize or sequence sites for further action; and
- Estimate CTC.

The PA process uses all available data from previous environmental investigations, archival records, and interviews associated with the MRS. On-site reconnaissance is not normally conducted as part of the PA, but is generally performed as part of the SI. However, on-site reconnaissance can be used in some cases to refine the boundaries of the MRS and locate areas having visual evidence of a release of MEC/MPPEH.

Conducting a PA requires a skilled and diverse team, typically composed of project managers, technical experts, and regulators. Records that may need to be researched include a variety of military documents,

such as technical reports, training records, supply logs, and aerial photos. Military and local historians that are knowledgeable of past military activities, including research, testing, and training activities that occurred over time, should be considered for inclusion as technical experts.

The PA should collect the following site-specific information:

- Information about the types and estimated quantities of military munitions known or suspected to be present or released at the site, including MC, and other hazardous materials and waste management activities; including, to the extent possible, dates and duration of all releases;
- Identification of past munitions operations, (e.g., storage, handling, open burning, open detonation, firing ranges, and bombing ranges including, to the extent possible, location of firing points, targets, range fans, run-in lines, buffer areas, etc.);
- Information on previous range clearance activities, reported incidents involving military munitions (including MEC/MPPEH), or previous removal actions;
- Other past and present site uses;
- Identification of past site operations or management practices having the potential to result in adverse environmental impacts;
- The identity, concentration, and human health or environmental effects of other constituents known or believed to be present on the site;
- Any prior agreements identifying reasonably anticipated future land use or imposing land use restrictions and, in the absence of these, current and reasonably anticipated future land uses;
- Data elements required to complete the MRSP and CTC analysis using approved DON methodology; and
- The general environmental setting of the site, including any existing documentation of site boundaries, receptors, exposure routes, topography, and geology.

The PA Work Plan should include project goals and objectives focused on MEC/MPPEH and MC, as appropriate. Project-specific goals and DQOs should be well defined and presented in the PA Work Plan. Establishing a good QC program is an important element in any successful PA. This ensures that RPMs and project teams have high-quality data on which to base their decisions and demonstrates to stakeholders that the PA is meeting established objectives. QC plans that are included in the work plan may include the development of a standardized data management form for cataloging PA information, the development of a system for rating the quality of each data item, the maintenance of a log of all data, and the performance of data QC checks.

Once a project team has developed the PA Work Plan, implementation of the data collection and archiving is conducted. Contractors should investigate archival repositories and document their findings as outlined in the work plan. The records search should examine the following:

- Dates of operations, missions, etc.;
- General boundaries of munitions activities area (e.g., testing, training, maneuvering, handling, treating, etc.);
- Specific locations of munitions activities (e.g., firing points, target areas, range safety fans);
- Areas not used for munitions activities;
- Types and quantities of munitions used or treated;

- Munitions incidents; and
- Past investigations including removal actions or RAs.

In addition, interviews of installation personnel, retirees, and EOD personnel can provide first-hand knowledge of the location and dates of military munitions-related activities. Other interviews can be conducted with local activist groups which may have knowledge of these same activities. Whenever possible, information derived from personal interviews should be verified with other sources.

Once the PA data collection and archiving are completed or significantly under way, it is appropriate to review the archived data for the purpose of drawing conclusions about the MRS that will help guide decisions about the MR. The data review should look for important data items relevant to understanding past uses of the site. This can include EOD response reports, firing orders, munitions storage records, command and unit histories, aerial photographs, and newspaper articles.

The review should include the development of the CSM, which is a method of organizing, displaying, and using site data. These data facilitate the development of the hypothesis for the site history and status, and help draw logical conclusions about the site. At this early stage of the MR, the preliminary CSM should contain all known information on site use, concentrating on the delivery mechanism whereby the suspected MEC/MPPEH was placed in its current location, the exposure routes, and potential receptors.

The PA Report documents the findings of the data collection efforts and visual surveys. The PA Report identifies, evaluates, and describes areas that pose varying levels and types of hazards or risks, as well as areas that pose little or no hazard or risk to human health and the environment and/or areas that warrant an accelerated response. The results of the evaluation should clearly and defensibly support the PA recommendations for NFA, additional investigation, and/or immediate action. The PA Report will also identify what additional data must be collected to make informed decisions regarding future response actions. Major elements of the PA Report include:

- Introduction;
- Site Background:
  - Site location and setting;
  - Site description;
  - Site ownership history;
  - Site operations and waste characteristics; and
  - Source characterization (one for each source area);
- Migration/Exposure Pathways and Receptors (for both MEC/MPPEH and MC):
  - Local geology and hydrologic setting;
  - Releases and potential releases (actual or potential contamination areas);
  - Migration pathway receptors; and
  - Migration pathway conclusions and initial CSM;
- MRSP:
  - Summary with proposed site score (for MRSs proceeding to the SI or removal);
- Summary and Recommendations:

- Site explosive hazards;
- Site environmental risks; and
- Recommendations.

Resources RPMs should refer to when conducting a PA include: the [Munitions Response Historical Records Review](#), published as an aid to regulators reviewing PAs by the ITRC UXO Team; the PA for MRSs and AOCs SOW Template published by the NAVFAC MR Workgroup; and the NAVFAC BMS.

### 12.3.5 Site Inspection

Like the PA, the SI for an MRS serves the same purpose as the SI for an IR site, that is, to determine whether further response action is required at the site. Although subsurface intrusive investigations should be conducted during the RI if warranted, circumstances at an MRS can lead to a logical decision to conduct a limited subsurface investigation along with other SI field activities.

The SI is the on-site investigation to determine whether there is a release or potential release and the nature of the associated threats. Its purpose is to augment the data collected in the PA and to generate, if necessary, sampling and other field data to determine if further response action or RI is appropriate. The objective of performing the SI is to efficiently gather data necessary to make this determination. MR SIs are not intended to be a full-scale study of the nature and extent of contamination or explosives hazard. That level of detailed investigation is performed in the RI phase.

The SI for a MEC/MPPEH site is intended to:

- Build upon PA information by gathering initial field data;
- Perform field reconnaissance or surveys according to the SI Work Plan;
- Outline potential sources (disposal areas, target areas, operations areas);
- Determine more accurate MEC/MPPEH and MC site boundaries;
- Develop or expand on a CSM using field reconnaissance or survey data and initial hazard and risk screening results;
- Conduct initial munitions hazard screening;
- Summarize information and recommend future site actions; and
- Collect field data necessary to evaluate the site through the DoD MRS Prioritization Protocol.

Limited MC sampling is warranted in the SI phase and the main purpose of sampling is to confirm the presence or absence of MC contamination. Sampling for MC should be conducted in accordance with appropriate sampling protocol and QC. For MC sampling, several types of constituents may require analysis. The actual selection of MC for analysis should be based on the anticipated or known MEC items used at the site based on the PA. Potential MCs include, but are not limited to, EPA 8330 compounds and metals. Potential MC at small arms ranges are typically limited to metals, specifically copper, lead and zinc.

The detector-aided surface survey in an SI is often used to confirm that MEC/MPPEH is not an issue at a site when the PA did not conduct on-site reconnaissance and anecdotal evidence strongly supports that MEC/MPPEH activities were not conducted in the past. The detector-aided survey can also be used to confirm site features identified in the PA or in other research when there's already a strong indication that further investigation is needed. Due to the level of uncertainty present at the start of an SI, caution should be exercised when attempting to use a detector-aided survey to support the NFA decision. Design

of the survey must account for munitions type, detector capability, burial depth, and sufficient transect coverage of the site to support decision making. If the site has been extensively reworked (cut/filling) or was subject to non-range disposal (DMM burial, landfilling), minimal detector surveys may not be able to reliably detect munitions.

Handling or removal of MEC/MPPEH from the site is not normally part of an SI. In order to handle or remove MEC/MPPEH, appropriate prior planning and documentation will be required in the work plan and ESS, which will require NOSSA or MARCORSYSCOM/DDESB endorsement and approval. SI work is generally conducted using MEC/MPPEH anomaly avoidance, where any MEC/MPPEH found is left undisturbed for further investigation during the RI phase. The RPM needs to consider if additional security measures need to be taken to prevent access to the area. If there is a reason to respond to specific findings, coordinate with the installation Explosives Safety Officer, or potentially the local EOD for further actions.

The SI Work Plan should:

- Establish PQOs (Table 12-1);
- Determine the SI munitions survey design;
- Evaluate and select field reconnaissance instruments;
- Submit an ESS DR or prepare an ESS if expecting to encounter MEC/MPPEH during the SI; and
- Develop site-specific SOPs.

The work plan should include equipment, methods, and staffing to perform the following tasks:

- Gather site-specific data to further define the MEC/MPPEH and MC contamination. Topography, vegetation, soil characteristics, climate, land use on the site and adjacent real estate, potential exposure pathways, and ground scars should also be identified;
- Perform MEC/MPPEH field investigations to augment the data collected during the PA, including:
  - Limited detector-aided surface investigations;
  - Limited MC sampling;
  - Site footprint analysis to determine the study areas for subsequent investigations;
  - Spatial analysis and, if necessary, an aerial survey or other wide area survey techniques to define the aerial extent of MEC/MPPEH;
  - Any additional tasks needed to gather sufficient data to determine the need for further investigation or the appropriate response action; and
  - Further research of archives and photos to determine AOCs.

The MEC/MPPEH sampling design should be sufficient to identify MRS boundaries, potential target points, primary MEC/MPPEH release points and mechanisms, and areas of higher and lower MEC/MPPEH density.

When performing the SI fieldwork, field crews should take note of: the type of UXO and DMM and range scrap; craters and their locations; geology; topography; and vegetation. By determining the types and rough order of magnitude quantities of MEC/MPPEH present and refining the site boundaries, the effectiveness of follow-on work will be increased.

**Table 12-1 Sample MR SI Project Quality Objectives**

<b>EPA 7-Step Process</b>	<b>Sample PQO</b>
State the problem	The Navy and members of the project team want to determine if an NFA recommendation is appropriate, or if a recommendation to proceed to the RI or removal action is warranted
Identify the decision	If an NFA recommendation is appropriate where the potential for MEC/MPPEH is unlikely If an NFA recommendation is appropriate for MC, or is it warranted to proceed to an RI or removal action
Identify inputs to the decision	For MEC/MPPEH: <ul style="list-style-type: none"> <li>• The presence or absence of historical MEC/MPPEH use</li> <li>• The spatial boundary of MEC/MPPEH, if MEC/MPPEH is detected</li> </ul> For MC: <ul style="list-style-type: none"> <li>• The presence or absence of MC</li> <li>• If present, the concentration values for MC detected</li> <li>• The spatial boundary of MC, if detected</li> <li>• If MC is present in soil, its migration to surface water, sediment, or groundwater</li> </ul>
Define study boundaries	Horizontal and vertical boundary for both MEC/MPPEH and MC
Develop a decision rule	For MEC/MPPEH: <ul style="list-style-type: none"> <li>• NFA at the surface if none visually observed</li> <li>• NFA in the subsurface where presence of MEC/MPPEH is very low or uncertain and if no anomalies are detected during geo survey</li> </ul> For MC, NFA for site if MC is present but lower than screening levels
Specify tolerable limits on decision error	For MEC/MPPEH, decision errors related to equipment malfunction will be mitigated with daily equipment checkout For MC soil sampling, a false positive (Type I error) and a false negative (Type II error); QAPP contains precision and accuracy requirements
Optimize design for obtaining data	Selection of the most resource-effective sampling design that satisfies PQOs Generate sampling and analysis design alternatives

The SI Report should document the findings of the data collection efforts and field inspection. The SI Report presents the refined CSM, which is the basis for recommendations for future actions. It will report the results of the initial munitions hazard screening process and describe areas that pose varying levels and types of risks or hazards, as well as areas that pose little or no risk or hazard to human health and the environment and/or areas that warrant further action. The SI Report will identify what additional data must be collected, if any, in order to make decisions regarding future response actions.

At a minimum, the SI report should include:

- A description of the historical activities potentially resulting in the presence of MEC/MPPEH and MC;
- Current and reasonably anticipated future land uses and associated activities;
- A description of the MEC/MPPEH and MC encountered at the site;
- A brief description of the site setting, including regional and site-specific geologic and hydrogeological information;

- An updated and revised CSM, including a description of the primary source, release mechanism, and exposure pathways;
- A description of pathways of migration and exposure to the MEC/MPPEH and MC;
- An identification and description of potential human and environmental receptors;
- The results of the initial munitions hazard screening; and
- A recommendation on what, if any, further action is warranted.

All of this information must be documented in the SI Report. Major headings of the SI Report include:

- Executive Summary;
- Review of Existing Information:
  - Data Collection Activities;
  - Archive Search Report;
  - Site Description, Operational History, and documented hazardous waste management activities, if any; and
  - Results of PA;
- Discussion and Results of SI Survey:
  - Revised CSM;
  - Survey design and methods;
  - Assessment of potential MEC/MPPEH and MC hazards and risks; and
  - Results of the initial munitions hazard screening;
- Conclusions and Recommendations:
  - Potential or existing MEC/MPPEH and MC hazards and risks;
  - Recommendation for future action;
  - A CTC estimate for each MRS identified for further action; and
  - Updated MRSPS scoring information for sites identified for further action.

Resources RPMs should refer to when conducting an SI include the Statement of Work (SOW) Template for Site Inspection (SI) at MEC/MPPEH Sites, and the NAVFAC BMS.

### **12.3.6 Remedial Investigation/Feasibility Study**

The RI/FS for an MRS serves as the mechanism for:

- Collecting data to characterize site conditions;
- Determining the nature and extent of the MEC/MPPEH and MC present;
- Assessing risk and hazard to human health and the environment;
- Conducting treatability studies to evaluate the potential performance and cost of the treatment technologies that are being considered; and
- Performing an evaluation of remedial options for those sites that pose an unacceptable risk or hazard.



### 12.3.6.1 Remedial Investigation

The major difference between an RI for an MRS and an RI for a traditional IR site is the need to conduct detailed geophysical investigations to determine the extent of MEC/MPPEH contamination and to verify the boundaries of an MRS. Prior to start of any intrusive RI work, an ESS must be approved due to likely contact with munitions during subsurface investigation activities. Munitions that are recovered during any RI activities cannot be reburied and therefore must be disposed of properly. Keeping this in mind, RPMs will need to plan for the management and disposal of any MEC/MPPEH and munitions scrap that could be potentially recovered during the RI.

*Worker safety is the highest priority at a Munitions Response Site.*

Scoping the RI/FS should involve the entire project team consisting of DON personnel (e.g., technical, environmental, and installation), contractors, regulators, and other stakeholders (e.g., community). Involvement of DON and non-DON stakeholders during the RI/FS scoping process will ensure that the project needs are adequately defined to accomplish project objectives. Proper RI/FS planning will minimize the need for extensive rework which can lead to increased project cost and schedule.

When the project team meets to develop the scope of the RI/FS, the following goals should be included:

- Identify area(s) to investigate and determine the reasonably anticipated future land use with the project stakeholders (regulators, installation environmental and planning, etc.);
- Describe the type and content of studies needed to initiate response actions and determine the nature and extent of MEC/MPPEH and MC and associated hazard and risk;
- Determine if there is a need for removal actions; and
- Determine appropriate response mechanisms and authorities.

The mutual understanding among the project team and stakeholders of the above items is a key component of the RI/FS scoping stage and is critical to developing the data needs of the RI. In addition, the potential technical limitations should be identified and the impact on the RI/FS process evaluated by the project team during the scoping process. Technical limitations may include inaccessible areas at an MRS. The following are examples of criteria that can be used to classify an MRS area as inaccessible:

- Steep slopes (must be defined, but slopes greater than 30 degrees are generally considered to be inaccessible with most anomaly detection equipment);
- Under pavements, buildings, or any fixed objects;
- Encased in biological growth, (e.g., tree roots, coral, etc., which prevent proper detection); and
- The site is contaminated with improved conventional munitions (e.g., submunitions) or poses an unacceptable risk to workers; as worker safety is the highest priority at an MRS.

When scoping the RI/FS, the project team should identify the definable features of work (DFWs) and the methods for managing uncertainty in a MRP project. The DFWs are tasks that are separate and distinct from other tasks and have control requirements unique to that task. The following is a list of major DFWs that should be considered when scoping an RI/FS at an MRS:

- Site survey/grid layout;
- Vegetation removal;
- Surface/subsurface removal;

- Detector validation (for underwater sites primarily), GSV;
- DGM;
- Anomaly reacquisition and intrusive investigation; and
- MEC/MPPEH management.

Managing underwater sites under the MRP presents a unique set of challenges that are not encountered at terrestrial sites. These issues include: unique environmental conditions (e.g., mobility of items, etc.), operational difficulties (e.g., use of divers, specialized equipment, etc.), and the need to evaluate environmental impacts with respect to MEC treatment (e.g., transmittal of shock wave, etc.).

After collection of the data to determine the nature and extent of the MEC/MPPEH and MC at the site, a hazard assessment (HA) is performed to determine if MRSs or portions of MRSs pose an unacceptable risk or hazard.

#### ***12.3.6.2 Munitions and Explosives of Concern Hazard Assessment***

The CERCLA response process includes the development of site-specific risk assessments appropriate to the requirements of a site. The results of the risk assessment help site managers decide whether further response action is required, and support the risk management decisions made throughout the remedy evaluation, selection, and implementation process. However, the HHRA methodology was not designed to address explosives safety hazards at MRSs.

To address explosives safety hazards, qualitative guidance for performing MEC HAs was developed by several federal agencies (including the DoD and EPA) and state and tribal organizations. The MEC HA serves two main purposes:

- Support the hazard management decision-making process by analyzing site-specific information to evaluate removal and remedial alternatives, and to assess land use activity decisions; and
- Support the communication of hazards between members of the project team and among other stakeholders, and by organizing site information in a consistent manner.

Table 12-2 provides the MEC HA values that were reached by consensus of the MEC HA technical workgroup.

The MEC HA analysis generates a qualitative score for a specific site and set of conditions assumed to be present at the site, or conditions that are possible in the future at the site. This score falls within one of four defined ranges of scores, called hazard levels, which are defined as shown in Table 12-3. MRSs in Hazard Level 1 have the highest potential explosive hazard conditions, followed by Hazard Levels 2, 3, and 4 having a high, moderate, and low potential for explosive hazard conditions, respectively.

MEC HA-related documents can be downloaded from the NAVFAC Munitions Response Sites Portal. While tools to assess the risks posed by MC in sediments have been developed, there is no methodology designed to address explosives safety and environmental hazards from MEC/MPPEH at underwater sites. In order to make an HA and management decision, underwater sites will have to develop a MEC/MPPEH HA model that addresses the following factors:

- **Accessibility:** The likelihood that a receptor will come in contact with (e.g. touch, move, or transport) a MEC/MPPEH item;
- **Sensitivity:** The likelihood that a receptor will interact with a MEC/MPPEH item such that it will detonate; and

- **Severity:** The potential consequences of the effect (e.g., death, injury) on a receptor should a MEC/MPPEH item detonate.

The evaluation of these factors will determine if a response action is required and where that response action should be conducted. In some cases, the optimum hazard management path may be to leave the MEC/MPPEH item in place. A safety and environmental hazard-driven assessment needs to be conducted to evaluate the best path forward. Benefits from MEC/MPPEH removal have to be weighed along with the potential safety hazards and environmental impacts of the removal process itself.

Resources that RPMs can use in conducting an HA include NAVFAC MRP RI/FS Guidance and EPA [MEC HA Methodology](#).

**Table 12-2 MEC HA Input Factor Maximum Scores and Resulting Weights**

Explosive Hazard Component	Input Factor	Maximum Scores	Weights
Severity	Energetic Material Type	100	10%
	Location of Additional Human Receptors	30	3%
<b>Component Total</b>		<b>130</b>	<b>13%</b>
Accessibility	Site Accessibility	80	8%
	Total Contact Hours	120	12%
	Amount of MEC	180	18%
	Minimum MEC Depth/Maximum Intrusive Depth	240	24%
	Migration Potential	30	3%
<b>Component Total</b>		<b>650</b>	<b>65%</b>
Sensitivity	MEC Classification	180	18%
	MEC Size	40	4%
<b>Component Total</b>		<b>220</b>	<b>22%</b>
<b>Total Score</b>		<b>1,000</b>	<b>100%</b>

**Table 12-3 MEC HA Hazard Levels**

Hazard Level	Maximum Score	Minimum Score
1	1,000	840
2	835	725
3	720	530
4	525	125

### 12.3.6.3 Feasibility Study

The primary focus of the FS is to ensure that the appropriate remedial alternatives are developed and evaluated in such a manner that the information can be presented to a decision maker and an appropriate remedy selected. The overall objectives of the FS are to:

- Develop and evaluate potential remedies that permanently and significantly reduce the threat to public health, welfare, and the environment;
- Select a cost-effective RA alternative that mitigates the threat(s); and

- Achieve consensus among DON, EPA, state, and local authorities regarding the selected response action.

Through the FS, DON should achieve consensus among project stakeholders regarding the most appropriate RA. In the case of an NPL site, EPA concurrence should be obtained. The FS process for underwater MRSs is the same as that for terrestrial sites, but with different response and process options. The general process for developing the FS includes assessing general RA process options and technologies, assembling these technologies and process options into remedial alternatives, and evaluating the alternatives for their suitability to address the threat/hazard at the MRS.

The process for developing and screening RA alternatives for MC is consistent with developing and screening RA alternatives for typical environmental contaminants. The RA alternatives for MEC/MPPEH that are developed and screened are different for terrestrial and underwater MRSs. The remedial alternatives are developed on the basis of the specific circumstances at the MRS, and to accomplish the RAOs developed in the RI. The RAOs, in turn, are based on the:

- Specific nature and extent of MEC/MPPEH and MC identified at the site;
- Impacted media and depth/distribution of MEC/MPPEH and MC;
- Potential fate and transport of MEC/MPPEH and MC, and potential routes of exposure and receptors; and
- Identified cleanup goals.

The RAOs for an MRS should be clear and concise, but allow sufficient flexibility for remedy optimization and efficient project decision making.

The process of identifying, evaluating, and selecting the appropriate remedy for an MRS begins with a review of the various remedial technologies and methods that are appropriate to the site and the threat it poses. A specific assessment of various remedial process options and technologies is conducted, and those options and technologies that would be potentially suitable for the site are retained, while those options and technologies that are not suitable are dropped from further consideration.

Remedial alternatives are assembled from the various process options and technologies that are retained from the initial evaluation of technologies. For the majority of MRSs, the following basic remedial alternatives are normally evaluated:

- No action;
- UU/UE;
- Removal; and
- Land/underwater use controls.

Per DoD policy, DON, while performing the FS, must consider action to remediate the site to a condition that allows UU/UE, and action to remediate the site to a protective condition that requires land use restrictions (i.e., LUCs or exposure controls). Consideration of UU/UE is to be incorporated throughout the investigation process, so that during the FS a realistic evaluation of UU/UE feasibility can be determined. The UU/UE alternative may be difficult to achieve for certain MEC sites, such as air to ground ranges, due to cost and technical factors, but relatively easy for small arms ranges. However even when a full UU/UE cannot be achieved, footprint reduction may be feasible and warranted to minimize LTM costs and return the maximum amount of land to unrestricted use.

The design of remedial alternatives is based on land or underwater use and the potential depth of MEC/MPPEH. Interaction between potential receptors and MEC/MPPEH is also considered when designing an RA for an MRS. Other conditions to consider include the ability to collect, store, transport, and/or destroy the MEC at the site. For an MRS where MC or other incidental contamination is addressed, the number of potentially suitable remedial alternatives may be significantly larger. Remedial alternatives potentially applicable in that case are similar to those applicable at any common IR site.

Screening the various remedial alternatives is performed next using the following three broad evaluation criteria:

- Effectiveness;
- Implementability; and
- Cost.

During the screening of remedial alternatives using these three criteria, the evaluation is typically conducted on a qualitative or semi-quantitative basis. Based on the evaluation, a reasonable number of alternatives is selected for detailed analysis. The results of the initial screening of alternatives should form the basis of DON's request to state agencies to provide potential state ARARs.

Once a list of viable alternatives has been retained from the initial screening phase, the alternatives are evaluated against the nine NCP criteria. The purpose of this step is to further evaluate and compare the alternatives. During the detailed evaluation, the alternatives are assessed with respect to each of the nine evaluation criteria, and then the alternatives are also evaluated comparatively against each other using the nine evaluation criteria as context. State and local community acceptance may not be evaluated fully until the PP is published and public review is completed during remedy selection. The DON ERP optimization policy requires that a GSR evaluation be completed for each of the alternatives retained for detailed analysis in the FS. The GSR metrics evaluated can also be incorporated into the review of the nine NCP criteria during the FS.

Threshold criteria must be met for an alternative to be selected as the remedy to be implemented, or these requirements must be specifically waived. For an MRS, the primary objective is to reduce an imminent hazard/risk to human health and the environment while being in compliance with the ARARs. ARARs may be categorized as chemical-, location-, or action-specific.

Balancing criteria form the basis for comparing and differentiating among remedial alternatives that successfully meet the threshold criteria. The following are the five balancing criteria used and all are weighted equally to every extent possible in comparing remedial alternatives:

- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume through treatment;
- Short-term effectiveness;
- Ease of implementation; and
- Cost.

Modifying criteria are generally considered at the time of remedy selection and documented as part of the PP/ROD. The two modifying criteria are

- State acceptance; and
- Community acceptance.

#### **12.3.6.4 Remedial Investigation/Feasibility Study Reporting**

The RI/FS Report is a significant document, as it forms the basis for the selection of the remedy and the ROD/DD. The selected remedy is then documented in a PP and ROD/DD. The RI portion of the RI/FS Report should document the investigation activities completed at the MRS. Information that should be presented includes the MRS background, a description of the physical characteristics of the site, a discussion of the objectives for the investigation activities, a description of the data collection methods and analysis results, the updated CSM, the baseline HA, and the recommended RAOs. The FS should summarize the development of project ARARs, the identification and screening of technologies and process options, the development and screening of remedial alternatives, and the detailed and comparative assessment of alternatives. The FS Report can be combined with the RI Report to form an RI/FS Report, but the RI and FS Reports can also be prepared separately. Below is a summary of the recommended RI/FS report format.

- Executive Summary;
- RI;
  - Introduction (include project background, objectives, scope, and MEC/MPPEH and MC of interest);
  - MRS Setting and Previous Investigations;
  - RI Field Work (cover MEC/MPPEH and MC activities);
  - Nature and Extent of MEC/MPPEH and MC Contamination;
  - MEC HA (cover methodology and results);
  - Tier 2 Baseline HHRA and ERA; and
  - RI Summary of Findings and Recommendations (include RAOs);
- FS;
  - Introduction;
  - Identification and Screening of Response Actions;
  - Development of Remedial Alternatives;
  - Detailed Analysis of Remedial Alternatives; and
  - Summary of RA Alternatives Evaluation.

Several MR-specific resources are available to the RPM and project team for use in managing and scoping the RI/FS. The SOW templates relevant to the RI/FS include the RI/FS SOW, the QA SOW, and the small arms range RI/FS SOW. Two cost estimating tools are available to the RPM and can be obtained from the FEC's MR Workgroup representative. One is specific for use at terrestrial MRSs. The other tool is the underwater RA cost-estimating tool. This tool can be modified and used to generate RI/FS cost estimates. Another resource is the NAVFAC BMS. The [Army Munitions Response RI/FS Guidance](#) provides much more guidance for performing the RI/FS.

#### **12.3.7 Proposed Plan/Record of Decision**

The PP contains the preferred remediation alternative from the FS based on the screening and detailed evaluation of all remediation alternatives. All required RAs for the MRS are documented in the ROD/DD.

The preparation of the PP and ROD/DD for an MRS project follows the same guidance as for a traditional IR site.

### **12.3.8 Remedial Action Construction and Operation**

MR actions likely will take the form of a combination of physical removal of munitions and implementation of LUCs. At these sites, there may be little construction required as the remedy may be implemented without emplacing a treatment facility or equipment. However, when taking response actions to address MC, classic design, construction, and operation of the RA may be necessary. In this case, actions at an MRS follow the traditional CERCLA process as described in previous chapters. Nevertheless, in the RA phase, the selected and designed remedy is implemented on-site. Both during and after a RA, controls are used to protect workers on the site and to protect the public from any residual risk that may remain on-site after the RA is complete. Once the response action has achieved all of the designated objectives as delineated in the ROD/DD, the site can be designated RC. At this point, either LTMgt will be implemented or the site will proceed to SC.

### **12.3.9 Response Complete**

As with an IR site, RC can only be achieved at an MRS when all required actions have been taken. RC for MC-related response actions follows the same process as traditional IR sites. Two NOSSA/MARCORSYSCOM measures help the RPM achieve RC with respect to MR actions, audits and verification:

- The audit is a process by which NOSSA or MARCORSYSCOM assess the extent to which a project complies with applicable explosives safety and environmental requirements related to the management of MEC/MPPEH in accordance with the approved ESS, OP 5, and other safety publications. Audits include a review of MR project documents and field activities, including the QC and QA processes; and
- Verification is the formal process by which NOSSA or MARCORSYSCOM finds that (1) the MR actions were completed per the approved ESS and (2) the final remedy, including required LUCs, is protective of human health and the environment with respect to explosives safety, consistent with the current, determined, or reasonably anticipated future land use of the MRS.

Within six months of completing MR actions authorized by an approved ESS, the responsible project manager must submit an AAR to NOSSA or MARCORSYSCOM for review and endorsement by the DDESB. The AAR should follow the guidance and format contained in NOSSA INST 8020.15 (series) Enclosure (5), "Guide for Preparing a Munitions Response Site After Action Report" or MCO 8020.10.

An AAR must contain the following elements:

- A brief description of the site;
- A request to cancel any exclusion zone or site approval established in the ESS;
- A summary of the MEC and/or MPPEH found;
- A description of the relative effectiveness and any limitations of the technologies used during the MR and the effects on residual risk relative to that originally projected;
- A summary of the QC and QA reports for the response;
- Maps showing:
  - Areas from which MEC and/or MPPEH were removed;

- Areas within the site where response actions were not performed and the rationale for not addressing those areas; and
- The known or reasonably anticipated end use of each area;
- A summary of the LUCs that were implemented, if any, and the areas to which they apply; and
- A summary of provisions for LTMgt.

An [example AAR](#) is posted on the NAVFAC ERB website to help with developing a project-specific AAR.

#### **12.3.10 Site Closeout**

SC should be achieved where possible at MRSs. SC at an MRS depends on clearly articulating the detection, identification, and removal of MEC/MPPEH in conjunction with a suitable QA/QC program for validation. NOSSAINST8020.15 (series) and MCO 8020.10 contains more information on achieving SC for different site types (small arms ranges, etc.).

### **12.4 Munitions Response Program Quality Management**

DON's goal is to ensure that an auditable, objective record is maintained for all aspects of DON MR actions. To meet this objective, OPNAVINST 8020.15A/MCO 8020.13A, and NOSSAINST 8020.15 (series)/MCO 8020.10, require that NAVFAC develop QA/QC procedures to address explosives safety. The QA of the risk presented by MC contamination, including the QA performed on laboratories that receive field samples for chemical constituent analysis, is addressed under the DON IRP. Two QAPPs are typically developed for each MRS, one to address MEC/MPPEH and a second to address MC.

A QA program shall be independent of the contractor or agency executing the response action and is intended to objectively verify the adequacy of the contractor's MR actions, including its QC program. QA begins at project scoping with the proper technical requirements and continues through developing appropriate work plans, QC plans, and ESSs to address explosives safety requirements. QA is performed throughout all response phases and concludes with SC. A QAPP developed in conjunction with site work plans defines the QA objectives. The DoD, along with other federal agencies, has mandated the use of the UFP-QAPP. A sample MR UFP-QAPP and a UFP-QAPP template are available on the NAVFAC Munitions Response Sites Portal.

In the QC program, the contractor executing the response action maintains its own surveillance, oversight, and documentation of the project to verify the adequacy of the response action in meeting contractual requirements in the work plan, ESS, and other defining documents. QA is performed by the Government to verify the contractor QC process and verify measurable components of the work. QA builds confidence in the end results of the project. QA and QC programs are particularly valuable tools in building confidence with regulatory agencies and the public that hazards from MEC/MPPEH are being abated and work is being performed to a high standard.

In the MRP, QA is performed on the contractor performing the MR action. A team visits the project site to assess whether the contractor is complying with applicable requirements, and is technically capable of successfully performing the specified types of MR actions. The team also assesses if the contractor QC program is being effectively implemented and documented and verifies that the systematic controls and procedures necessary to ensure continued acceptable performance of the MR action are in place.

The RPM has the choice of having the QA function performed by a third-party contractor or by using available DON resources (i.e., the NSWC IHEODTD) or some other DON explosives safety experts such as FEC-qualified UXO staff.



### 12.4.1 Three-Phase Control System

To help ensure project quality, QA and QC managers should inspect the processes and products in the three phases of control. The three phases of control apply to each DFW for a MR project.

The primary purpose of the three-phase control system is to require the contractor to plan and schedule the work to ensure that they are prepared to start each new DFW for a MR project. When the three-phase control system is performed as outlined in the specifications, success in completing the work to comply with requirements of the contract is enhanced. The three phases of control are the core of the quality management system and are composed of preparatory, initial, and follow-up phases.

1. **Preparatory Phase:** This phase is performed prior to beginning work on each DFW. It typically consists of a review of contract plans, checking to make sure all equipment has been tested and inspection points have been identified, and all preliminary work has been completed. For a MR project, identified inspection points might be detection of blind seeds or an agreed upon percent resurvey of each grid by the contractor's QC personnel;
2. **Initial Phase:** This phase is accomplished at the beginning of a DFW. The Initial Phase verifies that control for the work developed for the project is implemented and the work is performed to the level agreed to. The Initial Phase involves checking initial work performed and verifying the adequacy of controls to ensure full contract and data quality compliance. For a MR project this might include making sure all initial vegetation removal work meets the required specification (remove all vegetation less than 6 inches in diameter, etc.), or for surface removal, that all initial work to remove metal over a certain size meets the required specification; and
3. **Follow-up Phase:** This phase consists of daily checks performed to ensure continuing compliance with contract requirements, including safety and control testing, until completion of the particular feature of work. For a MR project this could include making sure the crews run the IVS daily to check equipment performance or that a resurvey of 10% of an area collects data that are a repeat of data collected by the work team. These checks are a matter of record in the contractor's QC plan and will serve as a basis for defining the government's QA.

### 12.4.2 Purpose and Scope of the MRP Quality Assessment

The MRP QA program manages, assesses, communicates, controls, and applies sampling and testing techniques at MRP projects, which starts at the project's inception. The objectives of the MRP QA program are to:

- Review and make appropriate recommendations to the contractor's written MR-related work plans, SOPs, QC Project Plans, ESS, and other documents, as required by the contractor's SOW in advance of execution;
- Evaluate and document the quality of the contractor's MR actions;
- Conduct in-process QA and provide oversight of contractor activities by reviewing personnel qualifications and ensuring consistency between the work plans, SOPs, and the approved ESS;
- Provide a report of findings concerning the adequacy of the contractor MR actions, including actions to correct any inadequacies if found; and
- Provide supporting documentation for final NOSSA or MARCORSYSCOM verification of all response actions taken, as required by OPNAVINST 8020.15 (series)/MCO 8020.13 (series).

### 12.4.3 Developing a Quality Assessment Surveillance Plan

The above objectives are documented in a project-specific Quality Assessment Surveillance Plan (QASP). The document describes QA procedures to be implemented for the specific MR project and should be developed to assess the planned field work. QA activities are defined, planned, executed, and documented in accordance with the project-specific QASP. The plan can be developed using DON resources or a third-party contractor. The QASP is usually developed and based on the contractor's QC plan, the approved ESS, NOSSAINST 8020.15 (series) or MCO 8020.10 self-assessment checklist, and the work plan for the project. This ensures that the level of effort in the QA is commensurate with the level of effort for the project. An [SOW Template for Quality Assessment at an MRS](#) is available to support QA of MRP projects. RPMs can use the question list from the template to help develop the QASP.

### 12.4.4 DON MRP Quality Assessment Surveillance Team

The third-party contractor or DON personnel comprises the Quality Assessment Surveillance Team. The Quality Assessment Surveillance Team supports the RPM by assessing the effectiveness of the contractor's MR activities. The contractor's UXO Safety Officer may designate members of the QA Surveillance Team "authorized visitors" as defined by NOSSAINST 8020.15 (series) or MCO 8020.10, and as such should be allowed into all areas of the project site as they conduct their field observations. A typical DON MRP Quality Assessment Surveillance Team consists of a QA/Assessment Manager; UXO Technician(s); and Geophysicist Technician(s) when applicable. The Quality Assessment Surveillance Team can be refined based on specific project needs. In addition to carrying out the objectives of the MRP quality assessment, the DON MRP Quality Assessment Surveillance Team can provide support in:

- Developing the QASP;
- Reviewing the NOSSAINST 8020.15 (series) or MCO 8020.10 Self-assessment Checklist and/or quality assessment spreadsheet to identify specific areas to focus on in the QASP for the specific MR project;
- Conducting field QA to include placing blind seeds in the survey area or in a screening plant, developing a QASP for geophysical data collection, conducting intrusive investigation of anomalies, overseeing QC activities, and verifying grids are cleared of anomalies;
- Verifying MPPEH that has been assessed and documented as safe per NAVSEA OP 5; and
- Documenting all QA work and any necessary corrections.

### 12.4.5 Quality Assessment Scheduling Requirements

In order to perform the QA, schedules between the MEC contractor and the third-party QA contractor need to be considered. The basic process of how the MEC contractor and the third-party QA contractor interact on a project is as follows:

1. MEC contractor awarded contract;
2. MEC contractor submits schedule with time table for deliverables and specifies the number of field days;
3. Third-party QA contractor given schedule with performance work statement for proposal and award;
4. MEC contractor submits scoping worksheets and scoping meeting agenda (on complex projects the third-party QA may be involved in the scoping as well);

5. MEC contractor submits Draft Work Plan/MEC QAPP. Third-party QA contractor reviews and submits QA surveillance planning documents;
6. MEC contractor submits Final Work Plan/QAPP. Third-party QA contractor submits final QA surveillance planning documents. Field work date set. Mobilize for work (emplace QA seeds if part of project);
7. Third-party QA contractor mobilizes for QA work once the MEC contractor has initiated field practices;
8. Field work complete;
9. Third-party QA contractor submits Draft QA Surveillance Report;
10. MEC contractor submits report deliverable. QA contractor reviews document; and
11. Third-party QA contractor submits final QA Surveillance Report.

This process can change based upon the type of fieldwork being performed and whether any QA blind seeds are emplaced by the third-party QA contractor. It is recommended to check the quality of the MEC contractor early in the fieldwork to identify and correct any deficiencies early in the process.

RPMs should refer to the ITRC UXO Team's [Quality Considerations for Munitions Response Projects](#) published as an aid to regulators reviewing data quality (geophysical sensors, positioning and navigation, data processing, etc.). Also see the SOW Template for Quality Assessment, which includes a sample MR UFP-QAPP.

## **12.5 Disposal of Real Property Contaminated with Munitions and Explosives of Concern**

Real property known or suspected to contain MEC and/or MPPEH will not normally be transferred or leased from DON control until a MR consistent with the determined or reasonably anticipated land use has been completed in accordance with a DDESB-approved ESS.

Pursuant to DoD guidance on real property disposal, real property known to contain or suspected of containing explosive hazards may not be transferred out of DoD control (other than to the USCG) until the Chair of the DDESB has approved measures submitted by the transferring component to ensure the recipient of the property is fully informed of both the actual and potential hazards relating to the presence or possible presence of explosives. The recipient of the property must also be informed of restrictions or conditions placed on the use of the property to avoid harm to users due to the presence of explosives.

A recipient of such DoD property shall be provided:

- Details of any past removal or RA, including the degree of MEC or MPPEH removal and the process used to determine that degree of removal to be adequately protective; and
- Written notification that detection and removal methods are not 100% effective, and that residual hazard may remain in areas that were subjected to response actions.

It is important to remember that for sites that achieve SC, the residual hazard remaining at the site should be very low.

Based on potential explosive and chemical agent hazards present and the projected use of the property, the following types of use restrictions and conditions shall be imposed, as appropriate, on such DoD property:

- A prohibition on excavation or drilling in any areas known or suspected to contain MEC and/or MPPEH without appropriate permits or assistance;

- A prohibition on disturbing, removing, or destroying any found MEC and/or MPPEH;
- A requirement to immediately notify local law enforcement representatives of any discovery of MEC and/or MPPEH;
- A prohibition on the construction or installation of particular improvements including utilities, roadways, airstrips, navigable waterways, pipelines, and structures, both above and below ground;
- A prohibition on specific alterations, extensions, or expansions to such improvements;
- A prohibition on certain types of uses, such as child care centers, housing, or farming;
- A restriction to a specific type of use or owner, such as a state National Guard range;
- Inclusion of DoD component explosives personnel and the Chair of the DDESB in deliberations, decision making, and approvals pertaining to future MR activities to address MEC and/or MPPEH; and
- Inclusion of the restrictions and conditions in the recorded land records for the jurisdiction, to the extent allowed by state law.

Further detail on the requirements for the disposal of real property known or suspected to be contaminated with ammunition, explosives, or chemical agents is outlined in Chapter 14 of OP 5.

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## Chapter 13

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### Special Environmental Restoration Site Considerations

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Depending on the type of contaminants found at a DON ERP site, there is a possibility that there are additional requirements, or specific investigation/reporting and remedial steps that will need to be considered. These requirements are generally in addition to those found at a typical hazardous waste site. This chapter addresses the requirements for these atypical sites, including those with ECs or vapor intrusion.

#### 13.1 Resource Conservation and Recovery Act Corrective Action

As discussed in Section 1.2.1, RCRA was enacted in 1976 as an amendment to the Solid Waste Disposal Act, and establishes a comprehensive legislative framework for a cradle-to-grave hazardous waste management program. RCRA's focus is on regulating currently operating hazardous waste facilities and protecting human health and the environment through good management practices when generating, transporting, treating, storing, or disposing of hazardous wastes. In addition, RCRA requires the cleanup of releases from accidents or other activities at facilities that treat, store, or dispose of hazardous wastes. EPA refers to the cleanup of TSD facilities under these statutory authorities as a RCRA CA.

DoD is the lead agency to respond to hazardous waste releases at DoD sites following the provisions of EO 12580 to CERCLA and the NCP. However, EPA and the states also have authority to impose CA requirements under RCRA. Ideally, the boundary between contaminated areas requiring RCRA CA and those requiring CERCLA response action should be clear: CERCLA applies to releases associated with past operations or activities, whereas RCRA applies to facilities that generate or manage hazardous wastes or solid wastes that contain hazardous constituents. However, situations do arise where both RCRA and CERCLA apply.

As a matter of DON policy, CERCLA is the preferred process for conducting cleanups. FFAs usually specify that cleanups are to be accomplished under CERCLA, with RCRA as a potential ARAR. DON facilities subject to CERCLA response may be subject to RCRA if they generate, transport, store, treat, or have disposed of hazardous waste as defined by RCRA. Installations with active RCRA sites are likely to be required by regulatory agencies to identify and list all SWMUs on the installation. The RPM should work to ensure that the DON ERP is consistent with delineated RCRA CAs. RPMs should ensure there is cross-program integration early in the ER process. This will allow the requirements of RCRA CA permitting and CERCLA to be met via one program's set of procedural steps, thereby eliminating redundant reporting and documentation to address the administrative requirements of both programs.

Although CERCLA and RCRA CA processes are not identical, many similarities allow the potential for interface between the two. Table 13-1 illustrates the different phases of each program and presents a side-by-side comparison between CERCLA and RCRA CA remediation programs. Additional information regarding CERCLA/RCRA CA at federal facilities is provided in Table 13-2.

An overview of the RCRA CA process can be found in Chapter III of EPA [RCRA Orientation Manual](#). Additional background information and guidance is provided in EPA [RCRA Corrective Action Plan](#) (OSWER 9902.3-2A), and on the EPA [Corrective Action](#) website. NAVFAC has also created a BMS series to provide more detail.

**Table 13-1 CERCLA Response Actions and RCRA Corrective Actions**

<b>CERCLA Response Action</b>	<b>RCRA Corrective Action</b>
<b>*Preliminary Assessment/Site Inspection (PA/SI)</b> <ul style="list-style-type: none"> <li>• PA</li> <li>• HRS Scoring</li> <li>• Site Inspection (SI)</li> </ul>	<b>RCRA Facility Assessment (RFA)</b> <ul style="list-style-type: none"> <li>• Preliminary Review</li> <li>• Visual SI</li> <li>• Sampling Visit</li> </ul>
<b>**Removal Action</b> <ul style="list-style-type: none"> <li>• NTCRAs</li> <li>• Time Critical Removal Actions (TCRAs)</li> <li>• Emergency Removal Actions</li> </ul>	<b>**Interim Measures</b> <ul style="list-style-type: none"> <li>• Interim Corrective Action</li> <li>• Temporary Fixes</li> <li>• Alternate Water Supplies</li> </ul>
<b>Remedial Investigation (RI)</b> <ul style="list-style-type: none"> <li>• Site-Specific Data Collection</li> <li>• Source Characterization</li> <li>• Contamination Characterization</li> <li>• Waste Mixtures, Media Interface Zones</li> <li>• Hydrogeological and Climate Factors</li> <li>• Risk Assessment</li> <li>• Potential Routes of Exposure</li> <li>• Extent of Migration</li> </ul>	<b>RCRA Facility Investigation</b> <ul style="list-style-type: none"> <li>• Background Data Review</li> <li>• Environmental Setting Investigation</li> <li>• Source Characterization</li> <li>• Contamination Characterization</li> <li>• Characterization of Potential Receptors</li> </ul>
<b>Feasibility Study (FS)</b> <ul style="list-style-type: none"> <li>• Define Objectives and Nature of Response</li> <li>• Develop Alternatives</li> <li>• Conduct Detailed Analysis of Alternatives</li> </ul>	<b>Corrective Measures Study</b> <ul style="list-style-type: none"> <li>• Identify and Develop Alternatives</li> <li>• Evaluate Alternatives</li> <li>• Justify and Recommend Corrective Measures</li> </ul>
<b>Remedy Selection</b> <ul style="list-style-type: none"> <li>• Select Remedy that Meets the Nine NCP Criteria</li> <li>• Proposed Plan (PP)</li> <li>• Record of Decision (ROD)</li> </ul>	<b>Remedy Selection</b> <ul style="list-style-type: none"> <li>• Select Remedy that Abates Threat to Human Health and the Environment</li> <li>• RCRA Permit</li> <li>• RCRA Permit Modifications</li> </ul>
<b>Remedial Design/Remedial Action (RD/RA)</b> <ul style="list-style-type: none"> <li>• Design Remedy</li> <li>• Perform RA</li> <li>• Perform O&amp;M and Monitoring</li> </ul>	<b>Corrective Measures Implementation</b> <ul style="list-style-type: none"> <li>• Develop Implementation Plan, Program and Community Involvement Plan</li> <li>• Corrective Measures Design</li> <li>• Construction and Implementation</li> </ul>

\* This table is not meant to imply that there are phase-by-phase similarities, but rather that each program follows a process with similar phases.

\*\* Removal actions and interim measures may be implemented at any point during the response action or corrective action

**Table 13-2 Conducting CERCLA Response Actions and RCRA Corrective Actions at Federal Facilities**

<b>Remediation Step/Activity or Requirement</b>	<b>CERCLA Response Action Program</b>	<b>RCRA Corrective Action Program</b>
<b>Identification</b>		
Regulated Facilities	Any site where a hazardous substance has been stored, placed, disposed, or deposited, whether or not it is subject to RCRA	All contiguous property controlled by an owner/operator seeking or having a RCRA permit
Regulatory Triggers	For purposes of notifying the National Response Center, release of a reportable quantity of a hazardous substance  For environmental response purposes, a “hazardous substance” release that causes a “threat to human health or the environment” or a release of a “pollutant or contaminant” that poses an “imminent and substantial endangerment”	TSD of hazardous waste at a facility that existed as of 19 November 1980, and did not obtain RCRA closure by 26 January 1983
Regulated Materials	Any hazardous substance or pollutant or contaminant (with certain exceptions) (CERCLA §101(14))	Any hazardous waste or hazardous waste constituent listed in Part 261, Appendix VIII or Part 264 Appendix IX, or any waste exhibiting a hazardous characteristic identified in Part 261 released from a SWMU
Lead Agency	EPA or the federal agency controlling the facility	EPA or authorized state agency
<b>Prioritization and Delineation</b>		
Site Prioritization	HRS score	National Corrective Action Prioritization System (NCAPS)
Management Unit Delineation	AOC OU Site	AOC  CAMU  SWMU Hazardous Waste Management Unit
Land Disposal Restriction Applicability	Applicable when remedial wastes are removed from the site	Applicable when remedial wastes are “placed” (e.g., moved from one area of contamination to another); not applicable to CAMUs
Off-Site Access	Permission should be obtained	Permission shall be obtained
<b>Investigation and Planning</b>		
Remedy Selection Goals	To protect human health and environment, maintain protection over time, and minimize volume, toxicity, or mobility of waste	To protect human health and environment, attain cleanup levels, comply with waste management standards, and remediate (remove, treat, or control) release sources
Public Participation	Program is specified in regulations	Occurs as part of permitting process



**Table 13-2 Conducting CERCLA Response Actions and RCRA Corrective Actions at Federal Facilities  
(Continued)**

<b>Remediation Step/Activity or Requirement</b>	<b>CERCLA Response Action Program</b>	<b>RCRA Corrective Action Program</b>
Early Response	Through removal action provisions	Through interim measures
Incremental Response	Through OUs	Through phased remediation
Remedy Selection	Remedy selected by DON	Remedy selected by EPA or authorized state agency
Remedy Challenge	CERCLA §113(h) precludes citizen suits before a selected response action is complete to prevent delays in cleanup	RCRA §7002 governs citizen suits. No citizen suits may commence if an action is already being conducted under RCRA or CERCLA §104 or §106
<b>Implementation</b>		
Standards Governing Remediation	ARARs	As set forth in facility's permit
Permits	No permits required for on-site portion of removal or RAs (remedy must still comply with substantive requirements of permit provisions)	All necessary permits must be obtained for the selected remedy
Cleanup Levels	Negotiation based on ARARs, or promulgated state or federal standards where applicable  Cleanup levels shall satisfy acceptable risk range	Negotiation based on promulgated federal and state standards, risk derived standards, and/or other applicable guidance documents  Cleanup levels shall satisfy acceptable risk range
<b>Post-Closure/Post-Remedy</b>		
Post-Closure/Post-Remedy Requirements	Generally reevaluate not less than every five years	As established in permit
<b>Costs</b>		
Penalties	If stipulated in an Interagency Agreement	Specified in RCRA and state laws
Cost Recovery	Available	Not Available. See <i>Mehring et al. v. KFC Western, Inc.</i> , 116 S. Ct. 1251 (1996); however, costs incurred under RCRA and other programs that meet CERCLA's definition of removal or RA are generally recoverable under CERCLA Natural resource damages are not usually recoverable under RCRA, nor is the facility owner/operator usually liable for them under RCRA § 7003
Natural Resource Damage	Trustees may recover costs for natural resource damages (NRDs)	Consult counsel if trustees attempt to assert NRDs under statutes other than CERCLA or Oil Pollution Act

### 13.1.1 RCRA Corrective Action Completion Determinations

In 2003, EPA issued the [Final Guidance on Completion of Corrective Action Activities at RCRA Facilities](#) (68 FR 8757) to provide guidance on defining the appropriate type of completion determination. Two types of completion determinations are possible: (1) CA Complete without Controls, and (2) CA Complete with Controls. A “CA Complete without Controls” determination signifies that site-specific media cleanup objectives have been met, and the areas subject to the determination do not require any additional action or measures to ensure the remedy remains protective of human health and the environment. A “CA Complete with Controls” determination signifies that the only remaining task is performance of required O&M, monitoring, and/or compliance with and maintenance of institutional controls. The equivalent determination using DON ERP terms would be achieving the RC milestone and conducting further activities in the LTMgt phase to ensure protectiveness of the remedy.

For sites requiring LTMgt, the RCRA permit will specify “post-closure” requirements that may include monitoring, LUCs, and reporting (e.g., five-year review, annual reports, etc.). At the completion of the “post-closure” period when a “CA Complete without Controls” determination can be made, a completion report, similar to a RACR Amendment, may need to be prepared. Also, the RCRA permit would need to be modified. This RCRA permit modification generally is a Class III modification for completion of the CA, which requires a 60-day public comment period, a public meeting, and other community involvement actions, in accordance with 40 CFR Part 270.42(c). DON needs to respond to stakeholder comments on the proposed permit modification prior to the regulatory agency’s approval of the permit modification.

### 13.1.2 CERCLA/RCRA Overlap and Interface

There will be cases in the DON ERP when RCRA and CERCLA requirements overlap. The interface between CERCLA and RCRA begins with the overlap between the definition of a CERCLA hazardous substance (CERCLA §101(14)) and the definition of a RCRA hazardous waste (RCRA §3001). A RCRA hazardous waste shall either meet the description of a specifically-listed waste or exhibit one of four hazardous waste characteristics (i.e., ignitability, corrosivity, reactivity, or toxicity). A CERCLA hazardous substance includes constituents defined under other environmental laws, such as RCRA, CAA, CWA, and TSCA, but excludes petroleum (commonly referred to as the “petroleum exclusion”). CERCLA hazardous substances include most RCRA hazardous waste constituents, although a contaminant can be a RCRA waste without being a CERCLA substance (e.g., petroleum) and vice versa.

Because CERCLA was designed to address historical contamination, the requirements for using the CERCLA response process are broader than those for RCRA. By comparison, EPA and authorized states have the authority to compel cleanup of contamination at RCRA facilities. Generally, CA is invoked in the following circumstances:

- A RCRA TSD facility seeks an operating permit or a post-closure permit;
- An implementing agency (e.g., EPA or the authorized state) issues a cleanup enforcement order; or
- A site manager at a facility decides to voluntarily implement CA.

Cleanup of contaminated sites can be governed by either CERCLA or RCRA depending on such factors as the source and cause of the contamination, the status of the installation as either an NPL or a non-NPL site, and whether the installation has sought or is seeking a RCRA permit for managing hazardous wastes. EPA [Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA](#) (OSWER Directive 9355.3-01) contains criteria for evaluating RCRA/CERCLA eligibility.

Conflicts are not uncommon as the different regulatory agencies exercise their respective authorities under these statutes. However, these laws share the goal of protecting human health and the environment, and any procedural differences between CERCLA and RCRA should not substantially affect the outcome of remediation. This concept of parity between CERCLA and RCRA programs is outlined in EPA policy [Coordination Between RCRA Corrective Action and Closure and CERCLA Site Activities](#). EPA policy memorandum [Improving RCRA/CERCLA Coordination at Federal Facilities](#) re-emphasized the importance of improved RCRA/CERCLA coordination at federal facilities as one of the principal mechanisms for increasing efficiency and effectiveness of cleanups. Most importantly, the primary goal is to minimize duplication of effort and second-guessing of remedial decisions.

Environmental remediation implemented under CERCLA response obligations will be protective of human health and the environment such that remediation of releases shall obviate the need for further CA under RCRA (i.e., no further CA shall be required). With respect to releases of hazardous waste, RCRA shall be considered an ARAR in accordance with CERCLA §121, 42 USC §9621. FFAs should contain an integration clause that commits the regulatory agencies to accepting a final CERCLA remedy as also satisfying RCRA requirements. There should be no instances in which a CERCLA remedy is reopened under RCRA for further work. Should a regulatory agency seek to reopen a CERCLA remedy to address RCRA issues, the RPM should seek DON legal counsel prior to proceeding.

Given the potential for CERCLA and RCRA process overlap, it is important to understand the relationship and the distinctions between these regulatory program requirements. In addition, a CERCLA response has statutory advantages for expediting cleanups; for example, under CERCLA there is no need for permits for on-site actions. Finally, the overlap between CERCLA and RCRA can have implications on the eligibility of cleanup activities for DON funding.

## **13.2 Petroleum Storage Sites**

Petroleum storage sites include USTs, ASTs, fuel farms, bulk storage, and transportation. DON petroleum storage programs involve both cleanup and compliance issues; however, only cleanup of past contamination from petroleum releases is managed under the DON ERP and eligible for ER,N or BRAC funding. Information regarding the cleanup of petroleum sites under the DON ERP shall be added to the NORM database by the RPM (see Section 15.7 for additional information on NORM). Petroleum cleanup is managed under the IRP.

### **13.2.1 Underground Storage Tank Closure Requirements**

USTs are all tanks and appurtenant piping containing regulated substances in which the tank volume (including piping) is 10% or more beneath the surface of the ground. Closure of USTs is regulated under RCRA. In accordance with this requirement, states may be approved by EPA to administer the UST program. Therefore, UST closure regulations vary from state to state but generally require DON to:

- Notify the regulatory authority at least 30 days before the UST is closed;
- Empty and clean the tank by removing all liquids, accumulated sludge, and dangerous vapors. Remove USTs from the ground. A UST left in the ground must be filled with an inert solid such as controlled density fill, which may make redevelopment of the site costly or infeasible;
- Determine if contamination from the UST is present in the surrounding environment through the collection of environmental samples of soil and groundwater; and
- Submit forms/documentation (e.g., UST Site Check/Site Assessment Checklist, Closure Report) to appropriate regulators documenting completion of the above steps.

After completing these requirements, the UST is closed. If contamination was not detected, then no further action is required. The steps for evaluating USTs are shown in Figure 13-1.

#### **13.2.1.1 Release Response**

Closure of a storage tank may identify soil contamination associated with the tank and piping. If contamination is discovered during UST closure of DON owned and operated tanks, the regulatory authority must be notified within 24 hours. In accordance with the [DERP Manual](#), [OPNAV M-5090.1](#), and [MCO P5090.2A](#), immediate or short-term response actions required to limit or mitigate a spill or release caused by current operations must be funded by the operator that holds the tank maintenance User Identification Code (UIC). However, any required long-term RAs to address spill residuals are covered by the DON ERP.

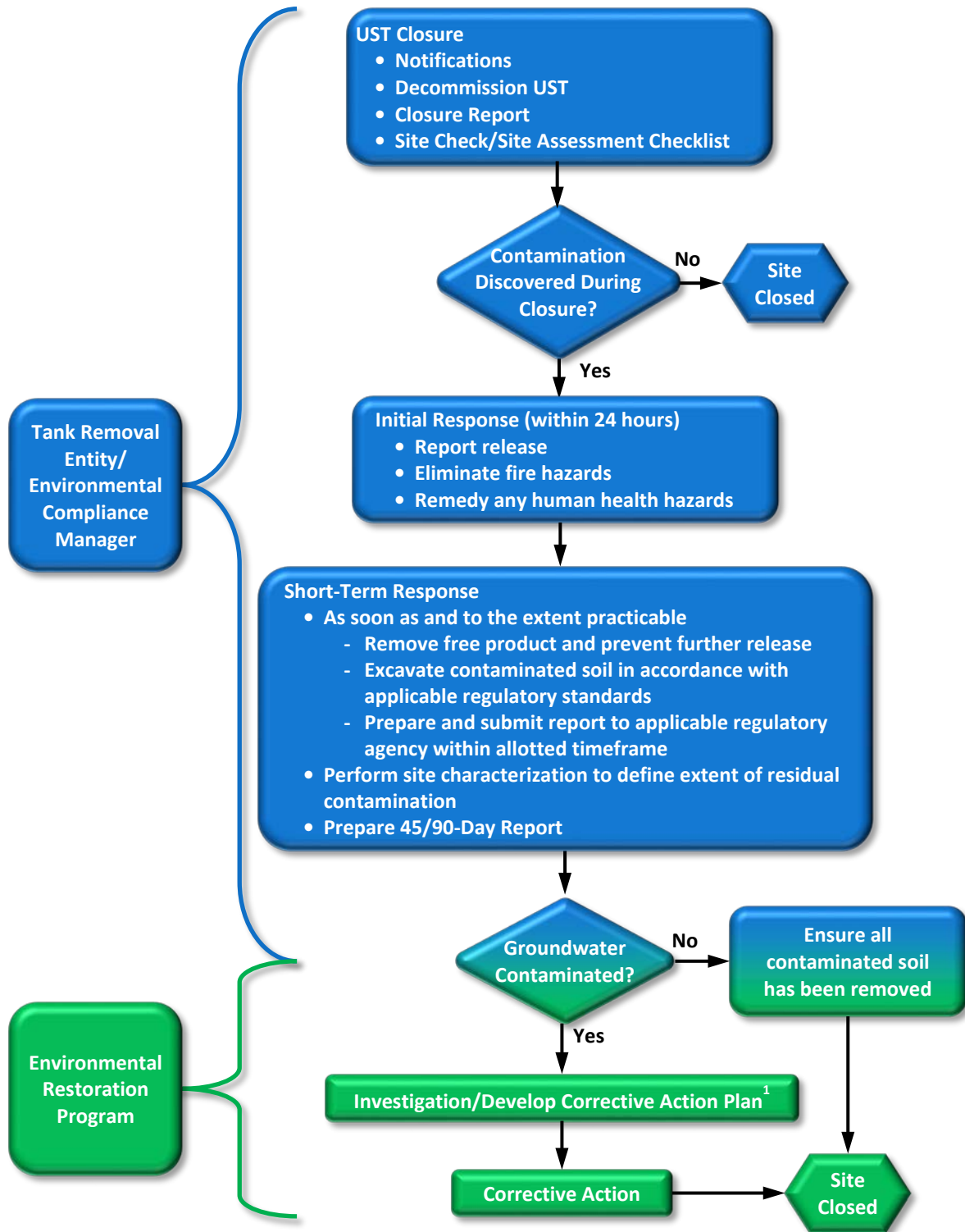
The following immediate and short-term response actions are required by regulation<sup>1</sup> if conditions warrant:

1. Remove as much substance from the UST system as possible to prevent further release to the environment;
2. Visually inspect any aboveground releases or exposed belowground releases and prevent further migration of the release substance into surrounding soils and groundwater;
3. Monitor and mitigate fire and safety hazards;
4. Remedy human health hazards posed by contaminated soils excavated or exposed by closure activities;
5. Sample for the presence of a release where the contamination is most likely to be present at the UST site, unless the presence and source of the release have already been confirmed;
6. Investigate to determine the possible presence of free product, and remove free product as soon as practicable; and
7. Provide all required submittals to regulators, such as the UST Site Check/Site Assessment Checklist and UST closure forms, and an initial site characterization report summarizing the initial abatement steps and resulting information or data.

In addition, prior to Step 5 above, the operator that holds the tank maintenance UIC should remove as much contaminated soil from the excavation area as possible. Sampling should include both soil and groundwater to provide a site assessment characterization. In accordance with DERP and DON policy, these immediate and short-term response actions must be funded by the operator that holds the tank maintenance UIC. Longer term actions, if necessary, are appropriate for ER,N or BRAC funding.

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<sup>1</sup>The list is taken from Subpart F Release Response and Corrective Action for UST Systems Containing Petroleum of Hazardous Substances, 40 CFR 280.62 Initial Abatement Measures and Site Check and 280.63 Initial Site Characterization.



<sup>1</sup> The site investigation/CAP development may result in the discovery of residual soil/soil leachability issues that have to be addressed.

Figure 13-1 UST Closure Process

### 13.2.2 Underground Storage Tank Transfer to the DON ERP

A release of POL associated with a UST may be eligible for ER,N or BRAC funding. The tank operator that holds the tank maintenance UIC is responsible to remove and replace or close in place an operational UST if it is discovered to be leaking, along with any short term response as shown in Figure 13-1.

The DON UST cleanup program follows a similar process as RCRA and CERCLA. The UST cleanup process from initial site identification to closeout is described in the NAVFAC BMS. See EPA's [UST Program website](#) for UST removal planning resources.

All POL releases from USTs and ASTs shall be properly investigated, with initial and short-term responses completed and approved by federal and state regulatory compliance agencies before a transfer to the DON ERP can be considered. ER,N or BRAC funds cannot be used for initial or emergency responses, unless such release is coming from an existing DON ERP treatment system.

If a POL release will require a long term response and transfer to the DON ERP, the tank operator holding the tank maintenance UIC is responsible for providing the following to the cognizant ER Manager or BRAC PMO Environmental Director:

- All closure documentation, including the 30-day notice, closure and assessment notice, and Site Check/Site Assessment Checklist or equivalent; and
- All documents describing the immediate and short-term response actions conducted at the site.

The ER Manager evaluates the documentation to determine if it is sufficient to request approval from NAVFAC HQ to place the site in the DON ERP. Upon NAVFAC HQ approval, the process to add a new site to the DON ERP will continue, and the FEC's ER Manager will assign an RPM who will be responsible for management of future site activities at the ER,N or BRAC funded site. All new sites to the DON ERP must be evaluated and prioritized against other requirements, and will be funded based on overall program risks and priorities. ASTs and other petroleum storage sites shall be addressed in a manner consistent with USTs defined in this section.

Removal of operational tanks (either aboveground or underground) and associated piping is not eligible for ER,N or BRAC funding. Removal of newly discovered, previously abandoned tanks may be eligible for ER,N or BRAC funding. Tanks are typically removed by the installation Public Works Department or as part of a MILCON project. The cost of tank removal is the responsibility of the operator that holds the tank maintenance UIC. This is related to the requirement described in Section 4.2.5 that removal and/or disposal of debris, and investigation and cleanup of contamination without documented evidence of hazardous substance release is ineligible for ER,N or BRAC funding.

The need to remove a tank may be identified during MILCON (or similar type construction/demolition) project initiation. If tank removal has been built into the project but unexpected contamination is discovered, it is the original programs' responsibility to complete cleanup of the site within the original construction/demolition footprint in accordance with applicable regulatory standards.

Although a petroleum release may be eligible for ER,N or BRAC funding, ER,N or BRAC funds for management of a petroleum release usually become available years after tank removal or replacement occurs. Therefore, it is important for the MILCON project to coordinate with the RPM during a tank removal to properly assess the nature and extent of contamination and consider the current or future remediation alternatives. This coordination will help minimize the cost of current or future remediation actions for all stakeholders.

### 13.2.3 Management of Bulk Petroleum Products – Spills and Leaks

The DoD [Management of Bulk Petroleum Products, Natural Gas, and Coal Manual](#) provides guidance on responding to spills and leaks from Defense Logistics Agency (DLA) Energy managed bulk storage facilities and transportation systems including USTs. DLA will fund the identification, assessment, and remediation costs of fuel spills and leaks from their bulk storage facilities and transportation systems that occur after October 1, 1992. The DON installation shall identify these sites and the estimated costs. POL contaminated sites resulting from activities conducted prior to October 1, 1992 will remain an ER,N funded responsibility. In some cases the DON installation and DLA may enter into an MOU that divides ER responsibilities for a specific location or facility differently from the breakdown described above. If the contamination is otherwise DON ERP-eligible, the ER,N or BRAC account should be used to fund the DON portion of the response action.

### 13.3 Radiological Sites

The CERCLA process to investigate, characterize, and remediate potential hazardous substances under the oversight of EPA or the appropriate state agency also applies to radioactive materials, including technologically enhanced naturally occurring radioactive materials (TENORM), naturally-occurring and accelerator-produced radioactive materials (NARM), in addition to byproduct, source, and special nuclear materials.

Radiological materials present at DON installations are controlled by one of four programs:

- NAVSEA 08R – Naval Nuclear Propulsion Program (NNPP);
- Strategic Systems Command, Strategic Systems Programs (SSP);
- BUMED (M3B4) / Navy and Marine Corps Public Health Center – Medical Programs; or
- NAVSEA 04N/NAVSEADET RASO – Radiological Affairs Support Program (RASP) (Industrial/Environmental G-RAM)

In order to perform these mission essential functions, the Navy holds a master materials license for use of radiological materials. Issues in any one of the four program areas can have repercussions in any of the other areas. It is therefore mandatory to coordinate and conduct radiological work with appropriate commands (e.g., NAVSEADET RASO) to avoid impacting other mission areas. Typically, the DON ER Program only addresses radioactive materials under the RASP (G-RAM) and medical programs.

G-RAM includes TENORM and NARM, in addition to byproduct, source, and special nuclear materials. G-RAM encountered at ER sites takes various forms such as contaminated soil, luminescent dials, or sediment in drain traps. Examples of sites that may reasonably be suspected of containing G-RAM include former radium dial maintenance areas (e.g., instrument shops, drain lines, exterior ground surfaces), radium paint shops, dredge spoils, slag, and waste disposal areas where G-RAM products were used and disposed; particularly at installations performing ship and aircraft maintenance.

Appendix B - Types of Installations and Operations that Generated G-RAM Contamination, provides a comprehensive listing of operations within DON that may have generated G-RAM contamination.

#### 13.3.1 Environmental Restoration Radiological Program Framework

The mandate of the DON ER Program as it relates to radiological (G-RAM) contamination is to identify and determine the best remedy to protect human health and the environment. G-RAM contamination assessment and management while similar to other CERCLA contaminants/releases, has several unique aspects including, but not limited to, risk/dose modeling, cleanup criteria, measurement techniques, radiation migration, and description of contamination or its physical quantities (e.g., pCi/g). Radiological

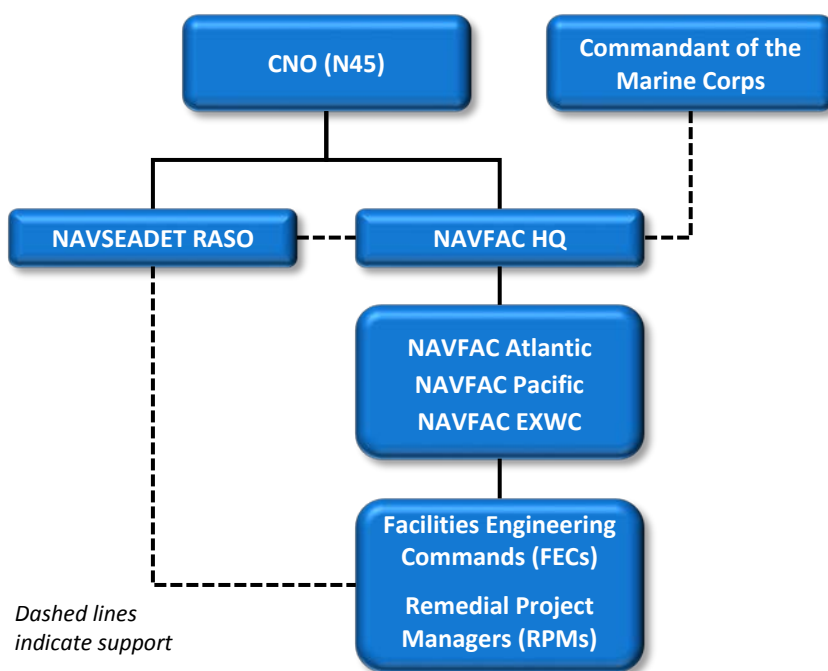


issues often entail overlapping regulatory authority including some exercised by the DON itself and specialized knowledge and expertise in radiation physics.

NAVSEADET RASO is the technical lead for all radiological issues and designates an Environmental Protection Manager (EPM) to support the NAVFAC RPM. NAVSEADET RASO will coordinate with NAVFAC on technical oversight for radiological issues and discussions with regulators and the public.

At installations with a nuclear component to their operations, FECs should inform NAVSEA 08R and NAVSEA 04N/NAVSEADET RASO (via the appropriate chain of command) of any agreements or plans being developed to investigate or clean up G-RAM radioactivity. NAVSEADET RASO can assist with contact information for local Naval Reactor Office representatives for coordination purposes. The NNPP has an interest in G-RAM issues to ensure consistency of efforts at sites under NNPP jurisdiction. For any G-RAM radiological issue at other installations, only NAVSEADET RASO needs to be kept informed.

Figure 13-2 shows the simplified DON radiological organization chart as it relates to the ER Program. Table 13-3 provides a brief overview of the responsibilities of various DON Components as they relate to G-RAM.



**Figure 13-2 Simplified Radiological Organization Chart for DON ERP**

To address the challenges and complexity of G-RAM management within the ER Program, DON has developed policies, directives, and guidance to clarify the roles and responsibilities for activities involving G-RAM at ER sites. In addition to what is covered in this document, the applicable policies, directives, and guidance for G-RAM within the ER Program are:

- DON [Policy on Activities Involving General Radioactive Material \(G-RAM\) at Environmental Restoration Program Sites](#) (Ser N453/10U158072, 18 Feb 2010);
- [OPNAV M-5090.1](#) - Environmental Readiness Program Manual, 10 Jan 2014;
- NAVFAC BMS;
- DoD 4715.27 – [Low Level Radioactive Waste Disposal Program](#); and



- NAVSEAINST 5100.18B –RASP.

### 13.3.2 Roles and Responsibilities within Radiological Program

Table 13-3, summarizes the roles and responsibilities of organizations/individuals and is intended to provide RPMs with the organizational context within which their responsibilities are executed pertaining to G-RAM contamination RA at ER sites. The NAVFAC BMS provides further guidance to RPMs for radiological cleanup. In addition, this section also presents requirements when using radiological contractors.

**Table 13-3 G-RAM Responsibilities of DON Components**

<b>DON Components</b>	<b>G-RAM Responsibilities</b>
Chief of Naval Operations (CNO N45)	<ul style="list-style-type: none"> <li>• ER Resource and Assessment Sponsor</li> <li>• RASP and radiation instrumentation Resource and Assessment Sponsor</li> <li>• Development of policy and guidance</li> <li>• Coordination of ER G-RAM requirements, support to DASN(E)</li> <li>• Oversight of ER G-RAM policy implementation</li> </ul>
Naval Radiation Safety Committee (NRSC)	<ul style="list-style-type: none"> <li>• Chaired by CNO N45</li> <li>• Establishing and overseeing policy and requirements for use, storage and disposal of all G-RAM, including material related to the NAVFAC ER / BRAC programs</li> <li>• Designated by CNO as responsible for overall radiation safety issues involving G-RAM</li> </ul>
NAVSEA (SEA 04N)	<ul style="list-style-type: none"> <li>• Administering policies and requirements of the NRSC and DON LLRW program</li> </ul>
NAVSEADET RASO	<ul style="list-style-type: none"> <li>• Technical Support Center for NAVSEASYSKOM and OPNAV N45 (NRSC)</li> <li>• Providing guidance and technical assistance including support for DON ERP</li> <li>• Conducting radiation safety training</li> <li>• Managing the LLRW Program - all G-RAM waste</li> <li>• Conducting HRAs</li> </ul>
NAVFAC	<ul style="list-style-type: none"> <li>• Responsible for overall management and execution of radiological and non-radiological sites within the DON ERP</li> </ul>
NAVFAC & NAVSEA (PAO)	<ul style="list-style-type: none"> <li>• Coordinating with NAVSEADET RASO regarding any public affairs engagements on radiological issues</li> <li>• Approving final release of information for the public</li> </ul>
Radiation Safety Officer (RSO) (where applicable)	<ul style="list-style-type: none"> <li>• Formally assigned by SYSKOMs and COs to assist them in managing specific or command level RASP programs</li> <li>• Responsible for operating procedures, emergency procedures, waste disposal, instrumentation, licensing, posting of required information, instructions, records, radiation surveys, training, management review, decontamination, transportation, and source procurement</li> </ul>

#### **13.3.2.1 NAVSEADET Radiological Affairs Support Office**

NAVSEADET RASO is the DON technical authority with cognizance for administering and enforcing the NRSC/NAVSEA G-RAM policies and requirements. For all activities involving G-RAM, NAVSEADET RASO is responsible for the following:

##### **Policy Assistance / Technical Assistance / Document Reviews**

- Provide policy assistance, technical assistance, and overall support to DON personnel authorized to select CERCLA response actions regarding G-RAM matters;
- Collaborate on determining that a site is “impacted by G-RAM”;
- Assist DON ERP in the evaluation and selection of appropriate response actions;
- Collaborate with and support DON ERP to identify potential federal and state ARARs and/or CERCLA risk-based cleanup goals as "release criteria" for G-RAM; Review and comment on dose and risk assessments for exposure to G-RAM;
- Participate in the drafting and technical review process for documents involving G-RAM issues or radiologically-impacted sites. These documents include, but are not limited to, CERCLA and RCRA documents, HRAs, contractor field work documents, and presentations pertinent to G-RAM aspects of the ER Program;

##### **Contracting / Source Selection / Contract Evaluation**

- Provide technical review of contract SOW for G-RAM work efforts or other work performed at radiologically-impacted sites;
- Participate, upon request, as a technical expert in evaluating contractors in the selection process for G-RAM projects;
- Provide technical input to the RPM for contractor performance reviews in relation to G-RAM contracts;

##### **Outreach / Communication / Regulatory Support**

- Collaborate with and support DON ERP to engage regulatory agencies on G-RAM issues;
- Upon request, make presentations to officials and the public on G-RAM issues and radiologically-impacted (G-RAM) sites in coordination with RPM;

##### **Resource Management – Scheduling**

- Review project schedules pertinent to radiologically-impacted sites or work involving G-RAM;
- Coordinate document reviews with NAVFAC to ensure that schedules in CERCLA FFAs and other enforceable agreements between DON and environmental regulators are complied with or extensions are obtained;

##### **Radiological Licensing / Personnel Qualifications**

- Review contractors’ NRC License or NRC Agreement State License for performance of work involving G-RAM;
- Review contractor and subcontractor license application, SOPs, training requirements, and personnel qualifications;

## **Field Operations Support**

- Provide technical consultation to the RPM on results of G-RAM field operations. This includes, but is not limited to daily reports, laboratory reports, and survey results;
- Perform on-site evaluation of work efforts and make written notification of significant findings to the RPM to assess technical compliance with work documents; federal, state and local regulations; radiological controls; and health physics practices;
- Upon RPM request, conduct field technical assistance visits to support G-RAM related activities;
- Recommend work stoppages to RPM as a result of unsafe work practices in the field or unsatisfactory findings during evaluations of G-RAM work practices. Should work stoppages occur, review and concur on corrective action(s) prior to resumption of field activities;

## **Incidents / Allegations/Notifications**

- Investigate radiological incidents involving G-RAM upon notification; and
- Report G-RAM related allegations per SECNAVINST 5430.57G.

### **13.3.2.2 NAVFAC**

RPMs must comply with all DoD regulations pertaining to the discovery of radiological materials at their sites. Radiological materials have special communication, investigation, handling, remediation, and disposal requirements. RPMs shall contact all appropriate organizations as soon as possible within their chain of command (local FEC, NAVFAC HQ, and NAVSEADET RASO) when there are radiological issues. Section 13.3.3 addresses requirements for communications when G-RAM is unexpectedly discovered or suspected.

The roles and responsibilities of RPMs on activities involving G-RAM at ER sites are:

## **Policy Interpretation / Technical Assistance / Document Reviews**

- Ensure DON personnel authorized to select ER response actions addressing G-RAM work with NAVSEADET RASO to evaluate and select appropriate response actions;
- Ensure NAVSEADET RASO involvement in drafting and review for all documents addressing G-RAM. Coordinate with NAVSEADET RASO to ensure schedules allow for sufficient review time;
- Collaborate with NAVSEADET RASO for identification of potential federal and state ARARs and/or CERCLA risk-based cleanup goals as release criteria for G-RAM;

## **Contracting / Source Selection / Contract Evaluation**

- Ensure all SOWs involving radiologically-impacted sites are provided to NAVSEADET RASO for review prior to Request for Proposal (RFP). Consult with RASO to resolve any G-RAM related issues with contractor proposals;
- Work with NAVSEADET RASO to evaluate G-RAM contractor qualifications and ensure appropriate levels of experience and capabilities are available for all selected contractors and subcontracts;
- When deemed necessary, include NAVSEADET RASO participation in contractor selection for G-RAM sites;
- Solicit NAVSEADET RASO's input for G-RAM contractor performance reviews;

### **Outreach / Communication / Regulatory Support**

- Consult with NAVSEADET RASO for all G-RAM investigations, remedial and removal actions, and DON interaction and communication with federal and state regulatory agencies and other stakeholders;

### **Resource Management – Scheduling**

- Maintain and provide project schedules to NAVSEADET RASO;

### **Field Operations Support**

- Ensure G-RAM waste, including mixed waste, is disposed through the DON LLRW Program. Ensure funding is available to support such disposal;
- Coordinate with NAVSEADET RASO on contractor work stoppages and resolution for resumption of work;
- Ensure proper radiological controls (QA/QC) are enforced at work sites based on NAVSEADET RASO recommendations;

### **Notification**

- Contact NAVSEADET RASO upon the discovery or suspected knowledge of a location that may have a G-RAM contamination release; and

### **Technical Assist Visits**

- Coordinate with NAVSEADET RASO to allow access to on-site operations in order to conduct technical compliance oversight.

There are instances when MILCON or other installation construction/demolition/renovation projects may encounter sites known or suspected to contain radiological hazards. Radiological expertise varies across the EV business line, with some FECs having expertise both within the Compliance (M) and Restoration (L) lines. Where otherwise not available, RPMs may be called on to provide the radiological expertise as reimbursable support to those projects. RPMs should consult their ER Manager on the level of effort for such support, as well as the feasibility considering ER workload. Such assistance should normally be limited to efforts associated with work under the ERP for remediation. Program areas such as Radon assessment/mitigation or active mission requirements shall be handled by compliance personnel, or the responsible mission component.

A Radiological Workgroup has been established with representatives from each NAVFAC FEC and FAC, NAVFAC HQ, BRAC PMO, NAVFAC EXWC, and NAVSEADET RASO. The workgroup members generally have radiological site experience and should be considered a resource when addressing G-RAM. The radiological workgroup meets regularly and is kept abreast of developments within the radiological community. Interaction with the radiological workgroup is not a substitute for interaction with NAVSEADET RASO.

#### ***13.3.2.3 Public Affairs Officer Involvement on Radiological Sites***

Public releases of information with regards to G-RAM differ from normal ERP sites as there are additional mandatory levels of review and approval. It is critical to properly address public concerns or inquiries regarding ERP radiological remediation projects to ensure public information releases are proactive, planned well in advance, coordinated, reviewed and approved by appropriate chain of command including NAVSEA and NAVFAC HQ PAOs. [The NAVFAC Public Affairs Guidance Memo 02-13](#) provides the process

for public release of information involving radiological issues. This Memo supersedes Guidance on Radiological Communications (#01-13). Public information activities that are included in this memo are:

- Media interviews (e-mail/phone/on camera);
- Media, Congressional, or public inquiries;
- Press releases;
- Public meetings;
- Tours of remedial sites;
- Communication plans;
- Public website information; and
- Public information material (graphics, fact sheets, brochures, posters, etc.).

All public information activities and material concerning radiological projects or remediation/cleanup efforts require public affairs review and approval in advance. All public information activities must be routed for review/approval through the chain of command from the local PAO to the NAVFAC HQ PAO, who will coordinate with the NAVSEADET RASO/NAVSEA PAO regarding any public affairs engagements on radiological issues. Full details of content for any communications must be shared with and approved by NAVFAC HQ PAO (in consultation with NAVSEADET RASO/NAVSEA PAO) before the release of any information related to radiological issues. Radiological project information that has already been approved for public release may be used at recurring public meetings, such as RABs, without further PAO review.

For emergency actions, a Navy Chief of Information briefing card will be coordinated with the Commander, Navy Region and forwarded to the NAVFAC HQ PAO as soon as possible.

Under no circumstances should RPMs address radiological materials outside of the G-RAM category. Public inquiries or concerns with all other radiological programs shall be immediately referred via PAO to the appropriate program.

#### **13.3.2.4 Requirements for Radiological Contractors**

DON contractors must have a valid NRC or Agreement State License to perform radiological activities. Licensing requirements depend on the federal legislative jurisdiction of the radiologically-impacted property being remediated. RPMs shall determine the federal legislative jurisdiction of the radiologically-impacted property ([NAVFAC Real Estate Procedural Manual - NAVFAC P-73 \[P-73, Chapter 26\]](#)). NAVSEADET RASO will determine the license requirement and verify the contractor has the correct type of license. The contractor's licensing and specific radiological requirements shall be included in the contract. If multiple radiological contractors are working on a site, an MOU is mandated between contractors by the contractor's NRC or State License to delineate custody responsibilities of DON's radioactive materials. NAVSEADET RASO and NAVFAC may review, but will not approve or sign the MOU between contractors.

#### **13.3.3 Requirements When G-RAM is Unexpectedly Discovered or Suspected**

It is possible that the discovery of radiological materials may occur during any aspect of a site assessment/investigation/cleanup. The following steps are mandatory whenever G-RAM is unexpectedly discovered, or suspected to be present at an ERP site.

**If in the field:**

- Halt work immediately to minimize exposure and isolate the area;
- Report event immediately to:
  - Cognizant ER Manager and Installation Managers (Public Works/Base POC) or Base Closure Manager (BCM), Caretaker Support Office, or ROICC;
  - NAVSEADET RASO at (757) 887-4692 – request to talk with an EPM; and
  - NAVFAC HQ ER Division, Assistant Commander of Environment via the chain of command;
- Gather available information to complete G-RAM Notification form and submit within 48 hours to ER Manager, BCM, Caretaker Support Office or ROICC, NAVFAC HQ, and NAVSEADET RASO; and
- Await NAVSEADET RASO's guidance before resuming work.

**If in the planning phase:**

- Consult NAVSEADET RASO at the contract scoping phase to incorporate appropriate planning, safety, and oversight and ensure selection of capable contract and/or contractor to address radiological concerns; and
- Consult with ER Manager or BCM as appropriate.

### **13.3.4 Environmental Restoration Radiological Program Regulatory Framework**

The CERCLA regulatory framework applies to the activities involving G-RAM at ER sites. Depending on federal/state/local jurisdiction, and regulatory requirements, additional regulatory representatives may need to be engaged when addressing G-RAM in comparison to a traditional IRP/MRP site.

#### **13.3.4.1 Multi-Agency Radiation Survey and Site Investigation Manual**

EPA, DoD, Department of Energy (DOE), and the NRC developed the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) (National Technical Information Service document number PB97-117659) to be consistent with CERCLA and provide guidance for investigation of surface and soil contamination at radiologically-impacted sites. It is not a DoD requirement to use MARSSIM, but it is recommended.

The Manual can be downloaded at [www.epa.gov/rpdweb00/marssim/](http://www.epa.gov/rpdweb00/marssim/).

MARSSIM uses a multi-phase approach to address radioactive contamination issues. Its application at a site or in a specific situation requires consultation with NAVSEADET RASO and appropriate regulators, or agency representatives. Once radioactive contamination has been identified and remediated at an impacted site, MARSSIM recommends a Final Status Survey for radiological release of the site for unrestricted use. The Final Status Survey is included in the RACR to fulfill the CERCLA requirement for closure.

Figure 13-3 shows the descriptive difference used between multiple programs for the same phases of work. MARSSIM operates within an overarching regulatory framework (CERCLA/RCRA) to provide for investigation/remediation of a G-RAM site. Radiological sites addressed under CERCLA/RCRA are addressed in the same manner as any other ER site. Radiation surveys are incorporated into the CERCLA documents or included as an appendix. See specific chapters corresponding to the CERCLA phase, or the NAVFAC BMS for more information.

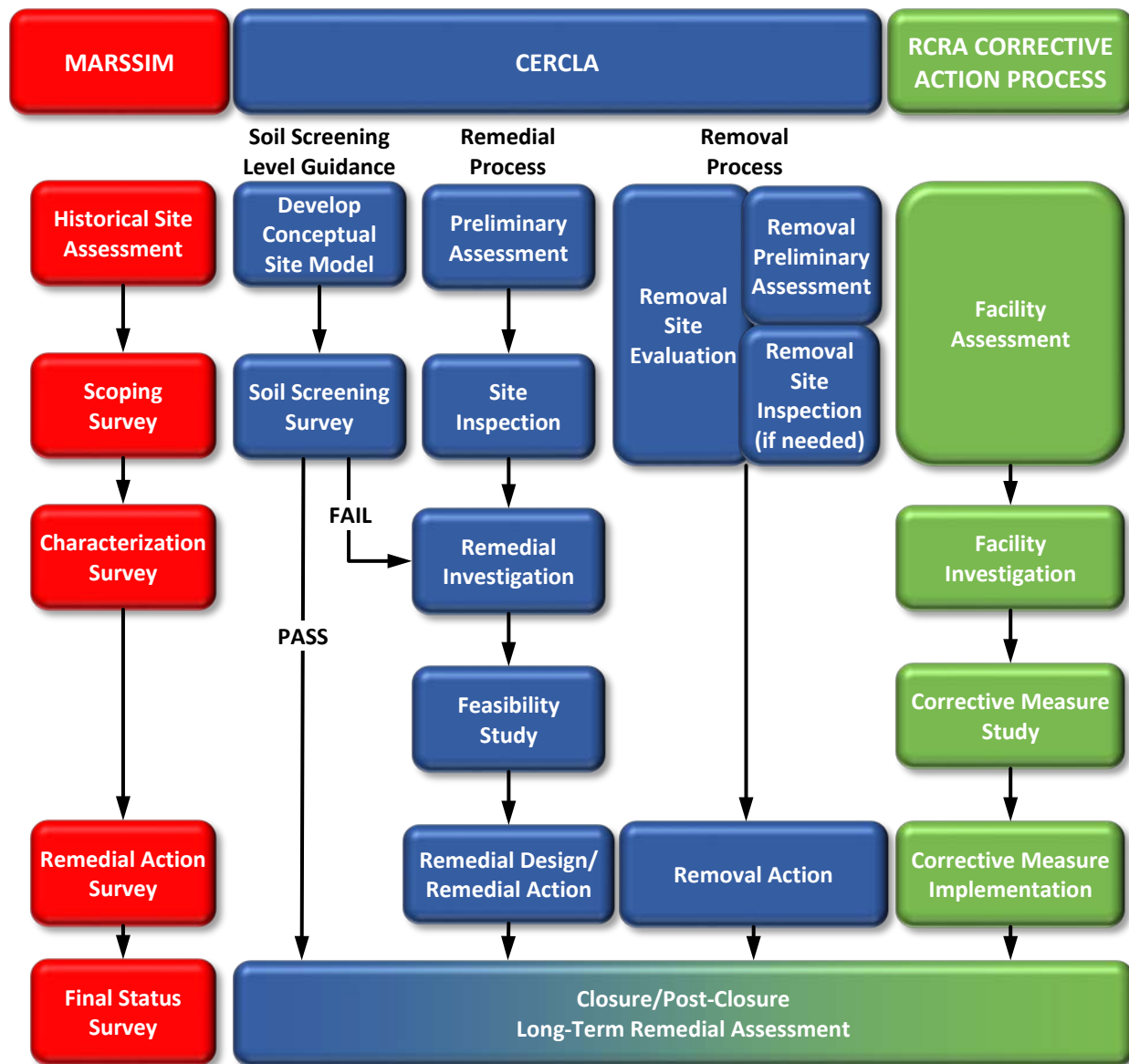


Figure 13-3 Comparison of MARSSIM, CERCLA, and RCRA Processes

#### 13.3.4.2 Historical Radiological Assessments

DON prepares HRAs to document the extent of past radiological operations at a specific installation, including any residual effects from these operations. HRAs are prepared for both active and BRAC DON installations and provide a record of known information regarding the history of the use, handling, refurbishing, and disposal practices of radioactive materials.

The processes necessary for preparation of HRAs for active DON installations with a potential for residual contamination from use or disposal of G-RAM are outlined in the HRAs for G-RAM Implementation Plan (NAVSEADET RASO, latest revision). NAVSEADET RASO will act as the primary point of contact for HRA preparation and oversight. RPMs are an integral part of the HRA process and will support this effort. HRAs are often used to satisfy requirements outlined in FFAs and other legal agreements. HRAs are updated if

significant information or a change in regulations is identified. Supplemental information to HRAs for DON commands undergoing closure is usually provided in individual site reports following RA, as necessary.

RPMs should be cognizant of the most recent HRA for their installation. AOCs noted in the HRAs may be entered into the program as an IR site if a radiological release is known or suspected. For active installations, refer to the [Post HRA Site Indoctrination Guidance](#) for the path forward.

Two HRA teams are involved in the preparation and oversight of HRA processes: the Oversight and Management Teams.

#### **Oversight Team**

- Provides upper level management and oversight for the preparation of HRAs for DON installations;
- Team members: OPNAV N455/CMC, NAVSEA 04N, NAVSEADET RASO, NAVFAC HQ, BRAC PMO, NAVFAC LANT, NAVFAC PAC;
- Major tasks include:
  - Establish the schedule of HRAs to be prepared over the next five years. The schedule is reevaluated annually;
  - Receive and distribute funding, as appropriate;
  - Notify the installations and other appropriate DON organizations that oversee or provide support to the installation about initiation of the HRA process;
  - Approve members of HRA Management Team;
  - Review and comment on Draft HRAs;
  - Concur on implementation of recommendations of the Final HRA; and
  - Plan for additional funding for out-year requirements.

#### **Management Team**

- Provides working-level management and oversight for preparation of HRAs for DON installations;
- Team members: NAVSEADET RASO EPM (lead) and representatives from NAVSEADET RASO Radiation Protection Manager, NAVFAC RPM, the installation and/or tenant commands (Environmental Manager, Public Works Officer, Radiation Safety Officer, or Historian), Contracting Officer, Contracting Officer Representative, stakeholders (federal, state, or local regulators, if involved), and the contractor preparing the HRA;
- Major tasks include:
  - Coordinate the contract for the HRA;
  - Participate in preliminary meetings at NAVSEADET RASO and the installation prior to initiation of the HRA (participation by team members will be based on the topics covered and level of support required);
  - Manage the contract during preparation of the HRA and participate in bi-weekly meetings;
  - Review internal drafts of the HRA and concur on resolution of team comments;
  - Determine distribution list for Draft HRA and approve for issuance;



- Review/resolve contractor-prepared responses to comments and approve Final HRA for issuance; and
- Publish the Final HRA.

#### **13.3.4.3 Radiological Safety**

NAVSEADET RASO and NAVFAC work together to ensure a safe working environment. Engineering Manual (EM) 385-1-80 shall be used to address safety issues regarding radiological concerns unless NAVSEADET RASO directs otherwise. RPMs shall provide NAVSEADET RASO the opportunity to review site HASPs with regards to radiological matters.

#### **13.3.4.4 Radioactive Waste Disposal**

G-RAM waste is managed through the DoD [LLRW Disposal Program](#) (DoD 4715.27). This regulation applies to all DoD LLRW disposal except LLRW generated under the NNPP under EO 12344 and LLRW related to nuclear weapons programs. The Deputy Chief of Naval Operations (Logistics) (CNO N4) provides guidance and resources to NAVSEA 04N for execution of the LLRW Disposal Program and has designated NAVSEADET RASO as the single DON agent for disposal of all non-NNPP LLRW.

In 1992, DoD appointed the Department of the Army as DoD Executive Agent for the management of the DoD LLRW Disposal Program. NAVSEADET RASO, through the DON LLRW Program, manages the DON's participation in the DoD LLRW Program. Participation in the DON LLRW Program is mandatory for all non-NNPP DON generators of LLRW. Installation COs are responsible for disposing of non-NNPP LLRW only through the DON LLRW Program under authorization of NAVSEADET RASO.

#### **13.3.5 Radiological Mixed Waste**

Radiological mixed waste is both radioactive and chemically hazardous waste. The hazardous constituents in the waste are regulated under RCRA. As authorized by CNO N4, non-NNPP mixed waste falls under the cognizance of the DON LLRW Program managed by NAVSEA 04N/NAVSEADET RASO. Disposal of non-NNPP mixed waste through the DON LLRW Program is mandatory for all DON generators of non-NNPP mixed waste. The NNPP is responsible for the management and disposal of all mixed waste from Naval nuclear propulsion work. Any issue pertaining to NNPP mixed waste should be referred to NAVSEA 08U.

The NNPP is a joint DOE and DON program. Pursuant to the FFCA, the DOE is required to prepare and submit Site Treatment Plans to address treatment of mixed waste for each site under DOE cognizance that generates and stores mixed waste. The Site Treatment Plan identifies treatment options for each mixed waste stream present (42 USC §9620).

### **13.4 Polychlorinated Biphenyl Sites**

As discussed in Section 1.2.1, the remediation of PCBs is regulated under TSCA. TSD requirements for PCB waste are specified in the final amendments to the TSCA PCB Disposal Regulations (40 CFR Part 750 and 40 CFR Part 761). The PCB wastes most commonly found at CERCLA sites meet the TSCA definition of PCB remediation waste (examples are contaminated soil, sediment, and building materials). One of the most important changes contained in these amendments was the provision that any cleanup or disposal of PCB remediation waste can now be performed "based on the concentration at which the PCBs are found," rather than based on the concentration of the original source (spilled) material. In addition, the final TSCA amendments provided that remediation wastes containing less than 50 parts per million (ppm) of PCBs no longer need to be placed in a TSCA-permitted landfill, but can be placed in a municipal or non-industrial, nonhazardous landfill that is permitted to accept low concentration PCBs. Remediation wastes containing PCBs at or above 50 ppm can be disposed in a TSCA-permitted landfill, or in a RCRA-permitted hazardous waste landfill.

The amended disposal regulations provide three options for cleaning up and disposing of PCB remediation waste:

1. **Self-implementing on-site cleanup and disposal:** This requires application and approval by EPA and then follows guidelines established in 40 CFR Part 761 for cleanup and disposal;
2. **Performance-based disposal:** When using this option, remediation wastes are managed under existing disposal regulations established for other types of PCB wastes; or
3. **Risk-based disposal approval:** This requires application and approval by EPA to use disposal standards other than the self-implementing standards or the performance-based standards.

These requirements may be ARARs, depending on site-specific conditions. Under the self-implementing cleanup provisions, cleanup requirements are based on whether an area is classified as high occupancy or low occupancy, as follows:

- Bulk PCB remediation waste (e.g., soil, sediment, sludge) and porous surfaces (e.g., concrete):
  - High Occupancy Areas: 1 ppm without restriction, 10 ppm with a 10-inch cap
  - Low Occupancy Areas: 25 ppm, or 25 to 50 ppm if fenced and marked, or 25 to 100 ppm with a cap
- Non-porous surfaces (e.g., non-corroded metal):
  - High Occupancy Areas: 10 µg/100 cm<sup>2</sup>
  - Low Occupancy Areas: 100 µg/100 cm<sup>2</sup>

The definitions for high and low occupancy areas are provided in 40 CFR Part 761. Examples of high occupancy areas include assembly line work stations, control rooms, and residences. Examples of low occupancy areas include electrical substations, non-office space in a warehouse, and other areas of an industrial facility where a worker spends a small amount of time. More detail can be found in the NAVFAC BMS.

### 13.5 Emerging Contaminants

The working DoD definition of an EC is “a chemical or material that is characterized by a perceived or real threat to human health or the environment with no published health standard, or an evolving standard”. ECs may also have insufficient or limited health and science data necessary to fully address them. There may also be new detection limits or contaminant migration pathways associated with ECs. Since standards, toxicity values, and science are continually evolving, so is the list of chemicals currently considered ECs. As such, RPMs are encouraged to contact their ER Manager if they are unsure if they may be dealing with an EC. More detail can be found in the NAVFAC BMS.

When ECs are lacking health-based toxicity values or established standards (e.g., MCLs), it is less clear if action should be taken requiring the use of funds, especially for actions not previously identified in budgets, or what concentration may trigger site characterization or cleanup. DoD has worked with EPA and the Environmental Council of States (ECOS) to reach consensus on how to address ECs as documented in three issue papers. These papers have been endorsed by DoD via instructions and memoranda. These papers which are pertinent to the DON ERP include:

- [Identification and Selection of Toxicity Values/Criteria for CERCLA and Hazardous Waste Site Risk Assessments in the Absence of IRIS Values](#), ECOS-DoD Sustainability Workgroup – Emerging Contaminants Task Group;

- [Emerging Contaminants Risk Communication Principles](#), ECOS-DoD Sustainability Workgroup – Emerging Contaminants Task Group; and
- [Initiation of Emerging Contaminants Characterization and Response Actions for Protection of Human Health](#), ECOS-DoD Sustainability Workgroup Issue Paper.

Subsequent to the development of the EC issue papers, DoD developed policy on ECs. The DoD [Emerging Contaminants](#) Instruction (DoDI 4715.18) establishes policy for the identification, assessment, and risk management of ECs that have the potential to impact the DoD. The DoDI contains guidance on the use of a three-tiered hierarchy for selection of toxicity values including the use of provisional values that were identified in the DoD/ECOS paper, shown above, titled Identification and Selection of Toxicity Values/Criteria for CERCLA and Hazardous Waste Site Risk Assessments in the Absence of IRIS Values (also known as the “Provisional Values” paper). The DoDI 4715.18 also endorses the DoD/ECOS paper, shown above, titled Initiation of ECs Characterization and Response Actions for Protection of Human Health (also known as the “Resource Triggers” paper) that provides guidance on what would trigger DoD action for an EC at a DON ERP site.

Although typically consensus has not been reached regarding the potential toxicity of many ECs, there may be situations where it is still possible or recommended to evaluate the nature and extent of a release, estimate potential risk, or even implement response actions in response to a release of an EC. In such situations it is important to ensure the actions taken are consistent with existing NAVFAC guidance and policy on ECs.

When an EC becomes a concern at a site, prior to any sampling, the RPM should:

- Use the CSM to determine the likelihood of a DON release based on historical use of the EC;
- Ensure a validated laboratory analysis method exists and will meet the required detection limits identified in the DQOs/PQOs;
- Identify human health and toxicological data gaps and uncertainties. If there is no toxicological information, establish how sampling data will be used to support decisions at the site; and
- Consult with the ER Manager if agreement is not reached.

If an EC is identified as a COPC at a site while the RI/FS is ongoing, the EC should be addressed as part of the RI/FS. If the EC is identified as a COPC after the ROD/DD is signed, the contaminant should be assessed no later than the next five-year review.

Members of the RAW or the NMCPHC are available to provide assistance with issues related to ECs. Additionally, DON has developed or is developing guidance on the specific ECs discussed in the following sections.

### **13.5.1 Perchlorate**

Perchlorate is an example of a chemical that was an EC and subject to great uncertainty for years, but DoD has helped increase understanding related to this chemical.

More information is available from the following sources:

- [DENIX Chemical and Material Risk Management Program](#);
- [DoD Perchlorate Handbook](#);
- [Navy Perchlorate Sampling and Management Policy](#) (CNO 5090 N456J, Ser/6U838120);
- [Navy Perchlorate Release Management Policy](#) (CNO 5090 N453C Ser/9U158028); and

- [DoD Memorandum on Perchlorate Release Management Policy](#).

### 13.5.2 Trichloroethene

Trichloroethene (TCE) is another example of an EC which is a contaminant at many DON sites. In the past, NAVFAC issued interim guidance regarding identification of toxicity values for TCE. When EPA finalized the IRIS toxicity profile for TCE in September 2011, the previous NAVFAC guidance became no longer applicable and was replaced by a fact sheet. Given other updates to the calculation of TCE toxicity and some of the “default” exposure factors, that fact sheet is now also no longer applicable. This example illustrates the importance of always ensuring the most current state of the science and NAVFAC guidance is being used when addressing ECs. Due in part to their “emerging” nature, guidance and recommendations may change rapidly as understanding evolves.

### 13.5.3 Per- and Polyfluoroalkyl Substances

DON is implementing a comprehensive strategy to manage and address per- and polyfluoroalkyl substances (PFAS) issues. A [DON PFAS website](#) includes policy, general information, and resources.

PFAS are a class of ECs that are primarily associated with the historic use and release of aqueous film forming foams and potentially associated with other industrial processes (e.g., hard chrome plating).

There are a number of acronyms referring to chemicals identified within the PFAS family. Perfluorinated compounds (PFCs) are a subset of PFAS. The best known and most studied PFAS are the perfluorocarboxylic acids, which include perfluorooctanoic acid (PFOA), and the perfluorosulfonates, which include perfluorooctane sulfonate (PFOS) and perfluorobutane sulfonate (PFBS). On 19 May 2016 the EPA released a lifetime [Drinking Water Health Advisory for PFOA and PFOS](#).

If there has been a historic release of aqueous film forming foams, there is potential for a complete exposure pathway for human or ecological receptors to PFAS. Sampling and analysis of PFAS has been directed by the OSD to include drinking water sample results for the fourteen PFAS that are listed in the current drinking water analytical method (i.e., [EPA Method 537, Rev.1.1](#)) as method analytes. The fourteen method analytes of EPA Method 537, Rev. 1.1 are:

- N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)
- N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)
- Perfluorobutanesulfonic acid (PFBS)
- Perfluorodecanoic acid (PFDA)
- Perfluorododecanoic acid (PFDoA)
- Perfluoroheptanoic acid (PFHpA)
- Perfluorohexanesulfonic acid (PFHxS)
- Perfluorohexanoic acid (PFHxA)
- Perfluorononanoic acid (PFNA)
- Perfluorooctanesulfonic acid (PFOS)
- Perfluorooctanoic acid (PFOA)
- Perfluorotetradecanoic acid (PFTA)
- Perfluorotridecanoic acid (PFTrDA)

- Perfluoroundecanoic acid (PFUnA)

Since there is no standard laboratory method for matrices other than drinking water, laboratories have made modifications to EPA Method 537, Rev. 1.1 to address other media such as sediment, soil, groundwater, and surface water. These modifications are not standardized among laboratories and therefore, neither are the lists of analytes that are detected. Analyses of these media should report results for all PFAS analytes included in the modified method.

The DON will apply the LHA to drinking water sample results only to determine if there is complete exposure. Other media, such as groundwater and soil, should be addressed on a site-specific basis. Data evaluation and site management decisions should be based on the DQOs for the site, which should include only the analytes with toxicity values. All other PFAS analyte results should be placed in an appendix of the report.

Consideration should also be given to other PFAS if there are promulgated state values. If results confirm the presence of PFAS in environmental media, then subsequent investigations and remedial decisions should focus on PFAS for which EPA-vetted toxicity values are available. Sampling and analysis of additional PFAS may be necessary in the future to develop remedial alternatives and optimize existing remedies. As the state of the science improves and additional toxicity information becomes available, or further criteria are developed by state or federal agencies, the number of PFAS analyzed for may increase. If necessary to protect human health or ecological exposure, an interim response action should be considered to reduce unacceptable exposure to PFAS. The first priority on all PFAS sites is to ensure no drinking water exposure.

DoD Policy on PFAS includes:

- [Testing DoD Drinking Water for PFOS and PFOA Policy Memo](#) ASD (EI&E).

DON Policy and Guidance on PFAS includes:

- [Interim Per- and Polyfluoroalkyl Substances \(PFAS\) Site Guidance for NAVFAC Remedial Project Managers \(RPMs\)/September 2017 Update NAVFAC memo;](#)
- [Navy Drinking Water Sampling Policy for Perfluorochemicals, Perfluorooctane Sulfonate and Perfluorooctanoic Acid](#) OPNAV CNO N45 memo;
- [Perfluorinated Compounds \(PFCs\) – An Emerging Environmental Issue](#) DON ASN (E) memo;
- [Frequently Asked Questions: Perfluorinated Compounds \(PFC\)/ Perfluoroalkyl Substances \(PFAS\)](#) DON ASN (E) memo;
- [PFC/PFAS – Identification of Potential AOCs](#) DON ASN (E) memo;
- [PFCs Drinking Water System Testing Requirement](#) DON ASN (E) memo;
- [AFFF Control, Removal and Disposal Policy DON ASN \(E\) memo;](#) and
- [Testing for Perfluorochemicals \(PFCs\) in Drinking Water](#) BUMED memo.

The documents listed above require RPMs to coordinate with drinking water managers regarding potential PFAS historical releases near drinking water sources. This is a good example of how ECs can require RPMs to interact and communicate with other programs.

The following actions for PFAS are eligible for ER,N funding:

- On-base investigation and remediation;
  - Additional groundwater sampling to determine plume; and

- Any necessary ER,N eligible remediation;
- Off-base drinking water sampling;
  - Investigative sampling where there is potential exposure from a DON source;
- Off-base bottled or alternate water;
  - Water filling stations and bottled water where there is confirmed unacceptable exposure from a DON source ; and
- Off-base investigation and remediation;
  - All investigative sampling and necessary remediation where there is a release from a DON source.

The following actions for PFAS are ineligible for ER,N funding:

- On-base drinking water sampling;
- On-base bottled water; and
- On-base installation of drinking water treatment.

#### **13.5.4 1,4-Dioxane**

1,4-Dioxane is an emerging issue since it was not included in many historical investigations. Similar to PFAS, 1,4-dioxane was used as a component in other chemical formulations and therefore historically it may not have been included in analyte lists. In industrial applications, 1,4-dioxane was added to stabilize chlorinated solvents, primarily 1,1,1-trichloroethane (TCA). Since 1,4-dioxane is a listed CERCLA hazardous substance, it should be included in investigations when supported by the conceptual site model. NAVFAC is currently drafting guidance on 1,4-dioxane to provide RPMs with information about when and how to include it in CERCLA investigations.

#### **13.5.5 Asbestos and Lead-Based Paint**

Although not considered to be ECs, asbestos and lead-based paint have had limited eligibility for remediation under the DON ERP as they are frequently dealt with during building demolitions or renovations with other funding mechanisms. The following guidance is available for managing these contaminants within the DON ERP:

- [Asbestos Guidance/Frequently Asked Questions \(FAQs\)](#) – This guidance provides RPMs with direction on evaluating asbestos at ER sites including funding responsibilities, risk assessment methodology, other technical issues, and regulatory requirements. The guidance uses an FAQ format to identify issues and promote a consistent approach to assessing asbestos.

Unless directly tied to an ER,N operational system, ER,N should not be used to address any immediate response actions on an operational installation. NAVFAC Memo Cat III/IV Contract Project Development and Asbestos Program Management assigns asbestos program management to the Public Works Business Line. Therefore, Public Works will address asbestos immediate response actions along with other actions outlined in the Asbestos Guidance/FAQs which are not ER,N eligible, such as the remediation or abatement of asbestos that has been released into the environment due to the deteriorating of an active structure or utility.

- [Lead Based Paint Guidance/Frequently Asked Questions \(FAQs\)](#) – This guidance provides RPMs with direction on both programmatic and technical issues related to lead-based paint at ER sites.

These issues include funding responsibilities, risk assessment methodology, and regulatory requirements.

- The NAVFAC BMS provides procedural guidance on addressing lead and asbestos as part of an ER site.

### 13.6 Vapor Intrusion Pathway

VI is the migration of volatile chemicals from the subsurface into indoor air. At sites where buildings are present above or near soil or groundwater contaminated with volatile compounds, it is important to determine if VI is occurring and causing a chronic unacceptable health risk in the building. Examples of common volatile chemical compounds include: VOCs, including petroleum hydrocarbons (e.g., benzene) and chlorinated solvents (e.g., TCE, semi-volatile organic compounds (SVOCs), elemental mercury, PAHs, and certain PCBs and pesticides). If it is known or reasonably anticipated that these chemicals may be present in subsurface media (soil, groundwater, soil gas) and there is a potential complete human exposure pathway to indoor air, a VI evaluation should be conducted.

Prior to initiating a VI evaluation, it is important to confirm that chemicals in subsurface media are of sufficient volatility and toxicity to pose a potential VI concern. DON issued [Navy/Marine Corps Policy on Vapor Intrusion](#) (OPNAV 5090 Ser N453/80158104) to clarify the approach for evaluating and remediating the VI pathway in the DON ERP. The policy states that detected chemicals must be associated with a DON environmental release, and that a VI evaluation can be considered at any point in the ER process (investigations, remediation, five-year reviews). For example, if a VI assessment is conducted after the ROD/DD is signed and shows an unacceptable CERCLA risk, action should be taken to mitigate the risk and documentation of the corresponding action should be included in the five-year review.

The [DoD Vapor Intrusion Handbook](#) currently serves as DON's guidance on VI. To maintain relevancy, topic specific VI Handbook Update Factsheets are issued as needed (e.g., Passive Sampling for Vapor Intrusion Assessment). Additionally, DON has developed a web-based interactive VI Evaluation Tool (VI Tool) as a resource for evaluating VI. The VI Tool is accessible via NIRIS under the Tools menu. EPA issued final guidance [Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air](#) OSWER Publication 9200.2-154 and the accompanying [Technical Guide for Addressing Petroleum Vapor Intrusion at Leaking Underground Storage Tank Sites](#) EPA 510-R-15-001, which provides information and guidance about how EPA recommends VI be assessed for petroleum hydrocarbons in these settings. Another useful resource is the ITRC document [Vapor Intrusion Pathway: A Practical Guideline](#). These documents represent some of the most current information on VI, and are incorporated into the DON approach to VI evaluation. Many states have also developed, or are in the process of developing, their own VI guidance. Due to the evolving process for addressing VI, RPMs are encouraged to consult with their ER Manager to ensure that they are using the most current DON guidance and policy regarding VI issues.

The DoD Vapor Intrusion Handbook uses a three-tiered approach to assess human health risks related to the VI pathway. The tiered approach allows sites with acceptable risk to be screened out (eliminated from further evaluation of this pathway) without expending significant time and effort. Within each tier, a multiple lines of evidence approach should be incorporated in the decision process. It is important to keep in mind that not all state health agencies follow a tiered approach. RPMs should coordinate with their regulators and identify the technical approach that is most appropriate for their site.

Additionally, NAVFAC and the NMCPHC developed [Guidance for Communicating Vapor Intrusion at Environmental Restoration Sites](#), which is designed to assist RPMs in planning and executing a communication strategy for sharing information with occupants at buildings with potential VI.



### 13.6.1 Tier 1 Screening Level Evaluation

The primary purpose of the screening level assessment is to distinguish between sites or buildings that pose little or no VI risk and those with potential risk that require further consideration. An important step in assessing the VI pathway is to develop an understanding of the site conditions using a CSM. The CSM is typically represented by a diagram that provides a visual portrayal of site conditions. It describes site conditions and identifies contaminant sources, the movement of the contaminants in the environment, and potential receptors and exposure pathways. The ER T2 resources include a [CSM checklist](#) for VI. To reflect the most up-to-date site information, the CSM should be continuously updated to clearly outline the contamination locations and types, the potential pathways, and the applicable receptors.

EPA recommends conducting a VI study in an existing building if volatile chemicals are detected in the environment within approximately 100 feet horizontally or vertically of the building. For petroleum hydrocarbons, a distance of 15 feet is reasonably conservative because these compounds so readily biodegrade in aerobic environments. It is important to note that the guideline distances may not apply if there is an atypical preferential pathway (a pathway that intersects the source area and provides little resistance to vapor flow to a building).

It is important to determine if a complete VI pathway exists at the site. Vapor flow rates can be influenced by a number of factors, including atmospheric pressure changes and building depressurization due to operation of exhaust fans or heating units within the building. The flow rate of vapors into and out of a building is often difficult to predict but generally will depend on factors such as subsurface conditions (e.g., soil properties and contaminant characteristics), building design and condition (e.g., cracks and conduits), and differentials in air pressure across the building foundation.

Many factors can influence the potential for VI to occur. Once it has been determined that a potentially complete VI pathway exists which may result in unacceptable indoor air levels, an SRA is conducted. The generic screening step typically compares existing site data (most commonly soil gas or groundwater data) with conservative health-protective screening levels. EPA has an on-line screening level calculator that can be used when identifying screening levels. RPMs should work with their regulatory agency to identify the appropriate screening level for the media/building/receptor in question. When multiple buildings warrant consideration, consider prioritizing buildings based on highest VI potential.

In addition to comparing subsurface vapor source concentrations to media-specific VI screening levels, modeling can be considered to predict indoor air concentrations in evaluating the potential impacts of VI. Modeling uses subsurface analytical data in the vicinity of a building and site characterization data that influence vapor transport to predict vapor concentrations inside buildings. The use of predictive modeling in EPA and state guidance documents varies due to the accuracy of modeling vapor fate and transport. Modeling can provide valuable information to consider as part of a VI investigation and RPMs should collaborate with stakeholders for consensus on use of predictive models. EPA guidance acknowledges the value of incorporating site-specific information (including site-specific VI screening levels) in VI evaluations. RPMs are encouraged to incorporate site-specific information into predictive indoor air models and avoid using conservative default input.

When indoor air data are collected, the RPM should consider concentration levels associated with potential risks from acute or short-term exposure that may require prompt or rapid response actions to be taken. Acute risks may be associated with potential explosive levels of methane or petroleum hydrocarbons, and the RPM should refer to chemical-specific lower explosive levels for identifying potential acute explosive hazards. The RPM should also be aware of and plan for the potential need for prompt or rapid response associated with non-cancer health effects that can be posed by short-term



exposures to indoor air from VI. The ER Manager should be informed and consulted when TCE short-term exposure concerns are identified.

If results indicate a potential for unacceptable risk, the RPM should conduct a site-specific evaluation. This is usually a more data intensive effort and may include collecting near-slab soil gas, sub-slab soil gas, and/or indoor/outdoor air samples.

### **13.6.2 Tier 2 Site-Specific Evaluation**

Due to the complexity of the VI pathway, reliance on a single approach or dataset may not be adequate to support site decision making. The recommended approach is to collect and evaluate multiple lines of evidence regarding the VI pathway that can include:

- Soil gas data;
- Groundwater data;
- Sub-slab soil gas (or crawl space) data;
- Near-slab soil gas sampling;
- Air data (from indoor and outdoor samples collected concurrently);
- Impact of site geology;
- Building characteristics; and
- Results of fate and transport modeling.

Not all of the lines of evidence need to be evaluated in order to investigate the VI pathway. RPMs need to evaluate the CSM to determine which lines of evidence are the most appropriate for the site and should be given the greatest weight. The [Quantitative Decision Framework for Assessing Navy Vapor Intrusion Sites](#) is based on data from a review of Navy commercial and industrial buildings. It provides a decision framework that can help the RPM identify and evaluate the most influential VI lines of evidence. It is also possible that findings from some lines of evidence may conflict with others (e.g., indoor air concentrations may be acceptable but sub-slab soil gas samples exceed screening criteria). The DON VI Tool in NIRIS can help to organize the multiple lines of evidence into discrete and manageable pieces to help RPMs and their partnering team to assess the VI pathway. The web tool offers site-specific guidance on the strength of the individual and cumulative lines of evidence in an easily viewed report format that can be used to support VI decisions at the site.

Collecting indoor air data has a number of unique issues associated with it. These include potential background vapor sources (both from sources inside and outside the building), the potential for large variation in concentrations over time, and the lack of agreement across states on the methodologies for collecting samples. As the process for assessing the VI pathway matures, the scientific and regulatory community has put more emphasis on collecting indoor air samples to measure direct exposure. However, the best approach for collecting these samples is still evolving. Therefore, RPMs should confer with their in-house technical support/NAVFAC VI experts on the latest sampling protocols prior to initiating any air sampling.

RPMs should consider the following when developing an indoor air sampling plan:

- The need to identify what levels would trigger short-term and long-term response actions prior to sampling indoor air, and what procedures should be implemented for risk communication of results to building occupants and installation COs. RPMs should consult with in-house technical support and legal counsel for additional guidance when considering short-term response actions;

- It is generally recommended that indoor air samples be taken on at least two separate occasions, typically during the summer and winter seasons to account for some of the seasonal variability that may affect VI;
- It can be useful to collect sub-slab soil gas samples concurrently with indoor air samples to evaluate the attenuation associated with the migration of the chemicals from below the slab into the indoor air of the building;
- Collecting indoor air samples in a private residence can be difficult due to access issues, potential for creating health scares, and the numerous non-site related sources that are commonly found in residences. RPMs should consult with in-house technical support and legal counsel before sampling in residences;
- Sampling should be conducted over a representative period of time of the population occupying the space, typically over 24 hours for residences and 8 hours for workplaces. However, leading VI experts are examining the value of longer duration sampling (e.g., 30 days) as a more accurate reflection of exposure;
- The number and location of sampling points will vary from building to building and should take into account the size of the building, compartmentalization of indoor spaces, spatial relationship of potential subsurface sources within the building footprint, and areas most reflective of receptor exposure; and
- Due to the significant number of commonly found sources of vapors in indoor and outdoor sources, it is critical that sampling strategies are designed to help distinguish between contaminants related to the subsurface release and contaminants due to background levels of indoor air contamination. DON [Guidance for Environmental Background Analysis Volume IV: Vapor Intrusion Pathway](#) provides more detailed guidance for evaluating background conditions in VI investigations. Common indoor and outdoor VI sources include:
  - Consumer products (e.g., cleaners, air fresheners, aerosols, mothballs, scented candles);
  - Emissions from building materials (e.g., carpets, insulation, paint);
  - Combustion processes (e.g., smoking, cooking, home heating);
  - Occupant activities (e.g., craft hobbies, home improvements, automotive repairs);
  - Volatile releases from nearby sources (e.g., vehicles, barbeques, paint, pesticides); and
  - Regional sources (e.g., industry air emissions, vehicle exhaust, agricultural, fires).

In accordance with the [Guidance for Environmental Background Analysis Volume IV: Vapor Intrusion Pathway](#), concurrent outdoor and indoor background samples should be collected with all indoor air samples to help distinguish between contaminants related to the subsurface release and contaminants due to background levels of indoor air contamination.

Prior to collecting any indoor air samples, it is important to conduct a building survey to identify all potential sources of indoor vapors. The survey can help identify any human activities and/or consumer chemicals that may contribute to the presence of chemicals in indoor air.

Due to the high number of consumer products that can contribute chemicals to the indoor air, consider using a handheld portable gas chromatograph/mass spectrometer designed for on-site detection as part of the building surveys to gather real-time indoor air concentrations of VOCs and SVOCs. This tool is useful in identifying potential non-site sources in the indoor space.

At the completion of the site-specific evaluation, the potential for unacceptable risk from VI should be understood well enough that a decision can be made regarding whether there is no unacceptable risk requiring action (i.e., NFA finding), or that the site warrants evaluating options for remediating the VI risk. Risk management decisions to address potential future VI risk may need to be further considered even if there is no current unacceptable VI risk when a subsurface vapor source remains at the site. In cases where there are no existing structures overlying or near a potential VI pathway, the RPM should document the potential for future VI risk if the site is developed.

### **13.6.3 Tier 3 Risk Management and Mitigation**

If VI is occurring at the site and posing an unacceptable risk to human health, the RPM should make appropriate risk management decisions to mitigate the VI risk. In DON non-residential buildings, the RPM should collaborate and coordinate with DON Occupational Safety and Health professionals to identify unacceptable risk/exposures and potential exposure mitigation measures. All reasonable remedial alternatives should be considered when selecting response actions, including LUCs, building ventilation systems, and active mitigation measures. DON has issued a [Vapor Intrusion Mitigation in Existing Buildings Fact Sheet](#) and a [Vapor Intrusion Mitigation in Construction of New Buildings Fact Sheet](#) to provide an overview of methods that can be used to mitigate VI along with important considerations for designing these mitigation systems to meet current building use and reasonably anticipated future use.

## **13.7 Contaminated Sediments**

Contaminated sediments pose an important and complex challenge for DON, as many DON installations are located within marine or estuarine sediment basins and watersheds along the coastline. The dynamic nature of aquatic systems makes characterizing the nature and extent of sediment contamination more challenging than typical terrestrial sites. Because sediments serve as a sink for contamination, sediment sites can also be impacted by both DON and non-DON releases. Therefore, a more robust evaluation of potential DON and non-DON sources of contamination is required to identify DON responsibility and ensure recontamination does not occur after cleanup. Because of the challenges that may arise, sediment sites can be very costly and challenging to remediate. As a result, DON issued [Policy on Sediment Site Investigation and Response Action](#), which details how and when to implement sediment investigations and response actions. A critical component of the policy is the requirement that all sediment investigations and response actions must be directly linked to DON CERCLA/RCRA contamination. The policy also introduced the Watershed Contaminated Source Document (WCSD), a report that documents the existence of both DON and non-DON sources whose activities may have or could continue to have an impact on sediments in a water body adjacent to DON property. The WCSD is required by the policy if there is the potential for non-DON sources contributing to the site's sediment contamination. More details on the WCSD can be found in the [Watershed Contaminated Source Document \(WCSD\) Fact Sheet](#). The [User's Guide for Determining the Sources of Contaminants in Sediments](#) (SPAWAR, TR#1907) is another resource pertaining to possible non-DON contaminant sources.

Another challenging aspect of contaminated sediment sites is the dynamic nature of aquatic environments. Because sediments are found in water bodies, a cleanup project must consider substrate movement due to waves, tides, currents, erosion, winds, and traffic movement (if site is located in a boating channel, harbor, etc.). The [User's Guide for Assessing Sediment Transport at Navy Facilities](#) (SPAWAR, TR#1960) can assist RPMs with the particulars of such dynamics in their cleanup sites.

Due to these unique issues associated with contaminated sediments, DON has developed additional documents to help RPMs with timely and cost-effective cleanups, including:

- [Implementation Guide for Assessing and Managing Contaminated Sediment at Navy Facilities \(NAVFAC UG-2053-ENV\)](#); and

- [Guidance for Environmental Background Analysis Volume II: Sediment](#) (NAVFAC UG 2054-ENV).

In addition to the complex issues associated with sediment site characterization, limited options are available for remediation. These options consist primarily of capping, dredging, in-situ remediation, and monitored natural recovery (MNR). Capping is the placement of a "cap" or a covering of clean material over contaminated sediment that remains in place.

Dredging is the removal of contaminated sediment from the site, to be disposed of off-site or in confined aquatic units. Dredging is not a treatment process so it still involves the management of contaminated sediments for proper disposal. MNR consists of monitoring physical, chemical and/or biological processes that can reduce the risk of the contaminants in sediment.

In-situ remediation consists of using various amendments to reduce the risk from sediment contamination. Effective in situ remediation of fine-grained, saturated soils and sediments poses a major challenge. While delivery and transport of amendments to and through groundwater aquifers is a demonstrated technology, movement of these materials through fine-grained sediments is difficult. For most complex sediment sites, the final remedy will involve a combination of some or all of the mentioned options and almost always includes MNR to address residual contamination.

More information on contaminated sediment technologies can be found in the NAVFAC [Contaminated Sediments at Navy Facilities: Cleanup Alternatives TechData Sheet](#) (TDS-2092-ENV). For more information on contaminated sediment cleanup technologies, a local Sediment Workgroup member can be contacted.

### **13.8 Portfolio Optimization Initiative**

NAVFAC HQ's Portfolio Optimization (P-OPT) initiative brings together a team of both internal NAVFAC and external industry SMEs provide optimization reviews on IR sites. In many cases these sites are pre-ROD and complex, and have not met the RC goal. In other cases, they are post-ROD sites with long-tail O&M and monitoring. NAVFAC HQ, along with the ER Managers, decide what sites should be included in the P-OPT initiative, and the team implements the RAA process into the effort via continual coordination and support to the RPM until CERCLA documents are final. The P-OPT team uses several tools and innovative approaches to ensure effective optimization is achieved at the sites.

### **13.9 Transfer of CERCLA Wastes to Off-Site Facilities**

Planning for the management of CERCLA waste at an off-site facility (i.e., for off-site treatment and/or disposal) must be conducted in accordance with the NCP. Specifically, off-site transfer of any hazardous substance or pollutant or contaminant as defined under CERCLA §101 (14) and (33) ("CERCLA waste") that is conducted by EPA, states, private parties, or other federal agencies, and that is taken pursuant to any CERCLA authority, including cleanups at federal facilities under CERCLA §120, are subject to regulations set forth in 40 CFR Part 300.440. Therefore, prior to transfer of CERCLA waste for management at an off-site facility, the RPM should confirm that the facility is permitted to receive wastes containing the constituents listed in the waste profile and consult with EPA (usually a regional office) to determine the acceptability of a facility proposed for the TSD of CERCLA waste. EPA determines if there are relevant releases or relevant violations at a facility prior to the facility's initial receipt of CERCLA waste. A facility that has previously been evaluated and found acceptable under this rule is acceptable until the EPA Regional Office notifies the facility otherwise pursuant to 40 CFR Part 300.440(d). It is recommended that the RPM include documentation of waste acceptance from the facility and EPA's determination of facility acceptability in the closeout documentation.

### **13.10 Handling of Classified Items or Objects Found On-Site**

If any unidentifiable potentially classified munitions-related items of a nuclear, chemical, or biological

nature are found on-site, contact NOSSA at (301) 744-4450 or MARCORSYSCOM Explosive Safety Branch immediately for direction on how to handle the material. Items should be guarded at all times from a safe distance until appropriate custody can be arranged.

If any other material is found that appears to be classified, which is not munitions-related, secure materials on-scene and immediately contact the installation security office, NAVFAC HQ and/or BRAC PMO as needed for further direction. Under no circumstances should classified materials be removed, stored or transported in non-approved containers.

## Chapter 14

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### Real Estate, BRAC, and Other Land Use Considerations

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Current and future land use is directly tied to decisions made by DON ERP RPMs. Factors impacting site decisions may include mission requirements or property transfer. DON ERP sites impact the land available to meet mission requirements. RPMs must consider the installation land use needs when making cleanup decisions.

RPMs will be addressing impacts from contamination across real estate boundaries, from both on- and off-site sources. This can occur under a variety of scenarios, including property transfer such as BRAC, or as part of ongoing operations such as a GOCO.

#### **14.1 Land Management**

FEC real estate planners need to coordinate with installation personnel to ensure that real property planning and management decisions consider ER and potential site contamination issues, including ammunition, explosives, and chemical agent contamination. The RPM's responsibilities include ensuring that FEC planning and real estate personnel are aware of the installation's contaminated sites.

##### **14.1.1 Land Use Planning**

Planners involved in developing and locating new facilities need to know where contaminated sites are and should interact with RPMs on the nature of the contamination, the length of the ER process, and the likely effects of the contaminated site on the proposed real property use. Similarly, FEC real estate personnel involved in out-leasing DON property need to be aware of contamination at sites so that appropriate decisions can be made. Therefore, Installation Master Plans, which address planning issues for specific installations, including plans for future land uses, should contain the locations of ER sites and the FEC Planning Division files should contain the appropriate ER documents for use by planners.

In addition to Installation Master Plans, as part of the DON restructuring into regional entities, Regional Integrated Master Plans (RIMPs) have been developed for planning purposes throughout a specific DON region. A RIMP contains similar information to the Master Plan and, therefore, contains the location of all ER sites that are in the region, as well as the various land use categories assigned to specific parcels on any given installation within a DON region. All ER sites should be identified in the RIMP for all installations in a region. RPMs should ensure newly identified sites are added to the Installation Master Plan and RIMP in a timely manner.

The RPM also should consult the Installation Master Plan or RIMP to identify reasonable and appropriate land use to be considered as part of any risk assessment developed in the cleanup process as well as for remedy selection. Specifically, the baseline risk assessment should address current or reasonably anticipated land use based on information provided in the Master Plans or RIMPs.

At BRAC installations, current and projected land use plays an essential role in determining cleanup goals. DON must ensure that remedies and cleanup goals are in compliance with policy and consistent with community reuse plans where reasonable. This is especially important at sites where contamination is remediated to acceptable levels based on specific assumptions regarding the projected reuse of the land.

In the absence of an approved reuse plan, remedies and cleanup goals should be based on the current land use or the most likely land use as identified in the reuse environmental impact statement. Risks should be presented for current or reasonably anticipated future land uses as well as those land uses

required to be calculated by regulatory agencies. BRAC cleanups based on projected land use, which is different from the current land use, may sometimes be in the best interest of both DON and the community. EPA [Reuse Assessments: A Tool to Implement the Superfund Land Use Directive](#) (OSWER 9355.7-06P) provides guidance for determining future land use assumptions for CERCLA response actions. Additional guidance on this subject can be found in EPA [Land Use in the CERCLA Remedy Selection Process](#) (OSWER 9355.7-04) and DoD [Responsibility for Additional Environmental Cleanup after Transfer of Real Property](#).

#### **14.1.2 Planning and Construction At or Near Contaminated Sites**

Site contamination discovered during the planning, design, or construction of DON installation projects, especially MILCON projects, can delay project completion, increase cost, and adversely affect the DON mission. Project planning, construction, and environmental personnel should work together to avoid siting projects on contaminated sites and/or over contaminated groundwater plumes, and take appropriate action during any of the project stages when contamination is discovered. To identify contamination problems or potential problems early in the siting process, the FEC should review available information from ER studies, including record searches, personal interviews, soil borings, chemical and physical analysis, and other relevant data. Soil investigations performed to determine foundation conditions should seek evidence of contamination.

Installations and FECs are encouraged to identify ER sites on a base-wide GIS to assist in reviewing prospective construction project locations. Plans should be reviewed to ensure that new construction projects are not located on ER sites, or that appropriate consideration is given to the presence of an ER site as part of construction planning, including determining if the site has received an NFA determination or confirming that the site remedy is protective for the intended reuse. All ER sites will be or have been identified in the RIMP for most if not all installations in the region.

The installation environmental staff should also ensure that the ER and Public Works personnel within the FEC are informed of the location of DON ERP sites, and formal review of all siting proposals should consider the proximity and potential impact of ER sites at an early stage. Installation personnel, including individuals from the Public Works Department who work in or around contaminated sites, should be informed of the geographic boundaries of the sites and receive appropriate training at a level relative to the nature of their work and the site contamination.

The FEC, Public Works Department, and all KOs should work together to develop the same notification for all contractors who work or may work in or near a contaminated site. For example, this notification includes identification of the geographic boundaries of the site prior to allowing contractors into the area, even where the contractors are building security fences around the contaminated site, and may include immediate training in proper health and safety procedures. The notification should take into consideration the nature of the work to be accomplished and the nature and location of the contamination. Contractors' construction plans should also account for protection of nearby residents and the environment from any potential releases from the construction site. More detail can be found in the NAVFAC BMS.

All efforts should be made to ensure that projects are not constructed on contaminated sites. However, there may be times when the project is being planned or is underway and contamination is discovered. In such instances, the following applies:

- If contamination is discovered or suspected at the location of a proposed project before design begins, ER,N funds may be used to investigate the nature and extent of contamination to determine the necessary cleanup or control measures and to fund the environmentally-acceptable alternative. This may be accomplished by adding the site to an ongoing ER study or

initiating a study if one is not already underway at the installation. DON ERP is prioritized based on risk to health, including safety, and the environment. The proposed project requirements do not change the DON ERP existing priority. If the project cannot be delayed to within the existing ERP schedule or cannot be relocated, project funds may be used for limited response action to address environmental contamination within the construction footprint, not to complete ER of the entire site;

- To the extent that a construction project (MILCON or non-MILCON) generates actions to address contamination, the costs of such actions are not ER,N eligible and shall be funded as part of the construction project. This includes the handling, mitigation and disposal or other disposition of contamination discovered before or during the construction activity;
- If site contamination is discovered between project design authorization and start of construction (usually award of contract), ER,N funds may be used to accomplish the necessary response action. The lowest-cost, environmentally acceptable response is eligible for ER,N funding (i.e., project funds, not ER,N funds, pay for any additional costs required by the project that are above normal environmental cleanup standards). The planned project's response action funding requirements do not take precedence over the existing DON ERP priority;
- If previously undetected contamination is discovered during the course of construction, cleanup of the contamination should be funded using the same appropriation being used for the construction. ER,N funds may be available depending on eligibility and availability for the cleanup of the contamination if construction funds are not available. In this situation, if the site is eligible, the priority for using ER,N funds for cleanup of the contamination during construction will be determined based on the relative risk approach, with the construction project site being compared to other sites needing funding. The schedule of the ongoing construction project will not determine the cleanup effort's priority for ER,N funding but it will be taken into consideration. ER,N funds can be used after the start of construction only to the extent required to satisfy CERCLA. If, as a result of contamination, the project is relocated or terminated, ER,N funds may be used to complete the investigation and clean up the site at a later date; and
- Special attention should be given to anticipated future use and risk assessment scenarios evaluated throughout the ER process. These scenarios may or may not be based upon assumptions consistent with site-specific planned construction activities and future land use. Several examples are as follows: (1) a determination of no unacceptable human health risk to a construction worker in an HHRA may be based on a duration of six months and actual construction will exceed this duration; (2) exposure may be concentrated in the area of highest concentration and not spread over the entire site; (3) exposure to future building tenants may not have been evaluated; and (4) future land use may include recreational exposure which was not evaluated for an industrial scenario.

In cases where contamination exists at sites within a POL facility where DLA Energy (formerly known as DLA/Defense Energy Support Center) is programming MILCON projects to upgrade the facility, DLA Energy has requested that DON sign "Agreement/Commitment to Clean" letters. As stated in CNO memorandum [Remediation Costs Associated with Defense Logistics Agency/Defense Energy Support Center MILCON Projects on Navy Installations](#) (5090 Ser N45/5U901466), these letters break out the costs between DON and DLA Energy concerning site contamination associated with the MILCON projects. These letters should be prepared and signed by the CNIC Regional Commander or Marine Corps Installation CO, after coordination with the FECs, to ensure proper accounting of DON costs. Also, the letter should state, "that nothing in this letter shall require the DON to obligate or expend funds in violation of the Anti-Deficiency Act."



### 14.1.3 Out-Leasing

Out-leases should contain restrictions that protect DON property from contamination caused by the tenant. In particular, out-leases should include a reference to 10 USC §2692, which restricts the use of a DoD installation for the storage or disposal of any toxic or hazardous material that is not owned by DoD, unless one of the exceptions specified in §2692 is met with SECDEF approval.

## 14.2 Base Realignment and Closure Program

To sustain military readiness and improve the defense mission during changing times and requirements, DoD recognized the need to close some of its installations and realign DoD missions at others through five rounds of BRAC program implementation. DoD realigned missions or transferred property within DoD at some BRAC installations, but a large portion of BRAC property is intended for transfer to another federal agency or non-federal entity. Many of the BRAC installations have required some type of activity under the DON ERP to make the property suitable for transfer. Although property disposal can occur outside the BRAC program, the vast majority of real property disposal associated with the DON ERP is done under BRAC.

RPMs should be aware that as part of every transfer of DoD property to a non-federal entity, the property recipient is afforded protection from liability by a CERCLA §120(h) covenant for hazardous substances caused by DoD. The federal government may also be responsible for cleaning up any contamination that can be attributed to DoD activities discovered after the property transfer. RPMs can find more detail in the NAVFAC BMS.

In accordance with 32 CFR Part 174, federal agencies that have been identified to receive BRAC property from DON must accept the property in “as-is” condition; DON will not retain continuing liability for the post-transfer environmental condition of these properties, unless this obligation has been waived by SECNAV. Cleanup and management responsibilities shall be established between DON and the receiving federal activity and set forth in the transfer document. DON is required to prepare an ECP Report, which is provided to the federal agencies prior to property transfer to ensure that the receiving federal agency is aware of any environmental issues.

Most methods and protocols in use by DON ERP at active installations are applicable to BRAC installations. The differences between the DON ERP at BRAC and active installations include:

- **Scheduling:** BRAC may require a more aggressive schedule of cleanup than active installations. Expedited response actions are emphasized. Environmental schedules are often driven by a recipient’s redevelopment of the property and the need to provide jobs to the community affected by the closure of the DON facility; and
- **Funding:** Congress established the BRAC account, which provided multi-year funds to pay for BRAC. After the implementation period for each BRAC round, this fund can only be used to complete the defined BRAC actions, including environmental, caretaker, and real estate costs. Costs to ensure environmental compliance of current operations are not supported by this account.

### 14.2.1 Base Realignment and Closure Policy

The BRAC Act of 1988 and the Defense Base Closure and Realignment Act, 10 USC §2687, govern the closure and realignment of DoD installations identified and approved for closing or realignment in various FYs. DoD desires to accomplish disposal quickly and efficiently to expedite redevelopment. This benefits local economies and saves money for readiness and other defense responsibilities.

Implementation of the overall BRAC process is conducted in accordance with DoD [Base Redevelopment and Realignment Manual](#) (BRRM) (DoD 4165.66-M), which provides a common set of guidelines for BRAC 2005 and remaining incomplete actions from prior BRAC rounds. Topics covered in the BRRM include:

- The overall process for BRAC;
- Working with affected communities and states to facilitate transition and base redevelopment;
- Management of human resources and programs available to assist in transition;
- Real property disposal process;
- Maintenance, utilities, and services to protect and maintain surplus facilities and equipment at BRAC installations;
- Necessary environmental actions at installations affected by BRAC decisions. Key objectives regarding environmental actions are:
  - Ensure protection of human health and the environment on BRAC properties;
  - Expeditiously transfer BRAC property to new owners;
  - Maximize the value of BRAC property by making wise public policy and business decisions; and
  - Maximize the use of all available tools to expedite response actions and redevelopment, including integration of early transfer authority (ETA), and privatization of response actions with redevelopment;
- Planning for growth where BRAC realignment actions increase military missions and functions and personnel levels at existing installations; and
- Contacts and resources for further information regarding specific questions and issues.

#### **14.2.2 Base Realignment and Closure Cleanup Plan**

To expedite the reuse and redevelopment of BRAC installations, the installation undergoes a “bottom up” evaluation of the environmental programs including cleanup activities. This review is conducted by BRAC PMO staff, represented by the BCT and the BEC. This review includes:

- Reviewing selected technologies for application of expedited solutions;
- Identifying areas for immediate removal actions to eliminate “hot spots” while investigation continues;
- Identifying transferable properties;
- Identifying overlapping phases of the cleanup process;
- Using improved contracting procedures;
- Interfacing with the community reuse plan and schedule;
- Embracing a bias for cleanup rather than studies;
- Validating the technology of the proposed remedy to ensure conformity with objectives;
- Identifying opportunities for application of presumptive remedies; and
- Using innovative management, coordination, and communication techniques (e.g., partnering).

The findings of this review are used to prepare the BCP. The BCP serves as a road map for the cleanup necessary to convey the property to communities for redevelopment. The BCP is a phased plan encapsulating and prioritizing requirements, schedules, and costs of the environmental programs to be implemented by the BCT for completing environmental action in support of the cleanup, reuse, and redevelopment of the installation.

BCPs should be made available to interested parties and community groups and become an integral part of the operations of the installation's RAB. However, although project level details are appropriate for BCT discussions/consensus, only relevant summary financial data are appropriate for release to the public. Issues affecting the execution of the DON ERP should be resolved at the BCT level or, where no dispute resolution can be made, ultimately by the DASN(E). For sites with existing FFAs, Interagency Agreements, and orders or decrees, the BEC, assigned as the DON representative on the BCT, proposes and negotiates changes needed to expedite cleanup. As a response action progresses, the BCP should be updated to reflect the progress that has been made, as well as any changes in community redevelopment needs.

### **14.2.3 Base Realignment and Closure Information Resources**

Information on the implementation of the BRAC program at Navy and Marine Corps installations is provided by the BRAC PMO. The [BRAC PMO](#) website is the primary source of information concerning BRAC policy, base locations, schedules, and links to other pertinent information. Additional BRAC resources can be found at:

- [DoD BRAC](#);
- [DoD Office of Economic Adjustment](#);
- [DENIX](#); and
- [EPA Base Closure at Federal Facilities](#).

## **14.3 Real Property Transactions**

NAVFAC real estate and planning personnel, in conjunction with installation personnel, are responsible for ensuring that the DON ERP is fully considered prior to engaging in real property transactions and as part of all land management decisions.

### **14.3.1 Sale or Transfer of Real Property**

40 CFR Part 373.1, in accordance with CERCLA §120(h)(1), 42 USC §9620(h)(1), requires all federal agencies, when contracting for the sale or transfer of real property, to notify prospective purchasers if hazardous substances have been stored for a year or longer on the property or have ever been released or disposed of on the property. If required, this notice identifies the type and quantity of such hazardous substances, and the time when the storage, release, or disposal took place.

CERCLA §120 requirements apply to all federal facilities, regardless of whether the real property being conveyed is part of an NPL facility. For installations on the NPL, EPA shall concur in the determination that the parcel is characterized as clean. The concurrence of the appropriate state agency/personnel should also be sought. In the case of real property that is not part of a facility on the NPL, concurrence should be sought from the appropriate state official.

Before conveying any real property on which any hazardous substances have been stored for a year or more, or on which a hazardous substance (or substances) is known to have been released or disposed, a federal agency shall comply with the provisions of CERCLA §120(h)(3), 42 USC §9620(h)(3). This section requires that the deed for each property where hazardous waste was stored, released, or disposed of

shall contain specific information regarding the hazardous substances and a covenant that warrants the following:

- All RA necessary to protect human health and the environment with respect to any such substance remaining on the property has been taken before the date of transfer (as noted above, this provision does not apply to federal-to-federal agency property transfers); and
- DON will conduct any additional RA found to be necessary after the date of such transfer.

DON is responsible for all expenses to the government resulting from the supervision and decontamination of DON's excess and surplus real property that has been subjected to hazardous material contamination. DON is required to notify the General Services Administration, or the disposal agency designee, of "any and all inherent hazards involved relative to such property in order to protect the general public from hazards and to preclude the Government from any and all liability resulting from indiscriminate disposal or mishandling of contaminated property." 41 CFR Part 102.75 provides the federal regulations concerning real property disposal.

In addition to the documentation required for conventional hazardous waste sites, those sites which are known or suspected to contain MEC must have FOST/FOSL documentation submitted to NOSSA or MARCORSYSCOM for review and DDESB endorsement in accordance with Section 12.5. NOSSA or MARCORSYSCOM/DDESB review and endorsement for property transfer is required irrespective of the overarching program.

#### **14.3.2 Documenting Current Environmental Conditions**

Environmental issues may pose the greatest obstacles to the property transfer because of the potential risk to human health and the environment. To properly communicate the environmental issues, the documents necessary to prepare the ECP report need to be assembled. The ECP report summarizes historical, cultural and environmental conditions and provides references to publicly-available reports, studies, and permits. Preparation of the ECP is coordinated with completion of environmental planning documentation, such as a documented categorical exclusion or environmental assessment. The environmental planning documentation addresses the other environmental issues associated with the proposed property transfer, such as potential impacts on natural and cultural resources, and can be cross-referenced to the ECP as necessary and appropriate. The following sources of information are important in developing the ECP report:

- Base-wide ECP (generally only at BRAC installations and transferring active or closed installations);
- Environmental study documents, such as CERCLA PA/SI, or RI/FS, RFAs, and other environmental agreements (such as an FFA);
- Monitoring reports;
- RD/RAWPs, RACRs;
- RODs/DDs; and
- Other similar documents.

The environmental elements required to document the ECP may vary based on the proposed real estate action. The following are the primary purposes and outcomes of the process:

- Assess any environmental risks associated with the surveyed property, and determine what actions are necessary to protect human health and the environment prior to effecting any proposed real property transaction;

- Support decisions for developing and documenting any necessary use restrictions and/or LUCs to be placed in the real estate agreement, including a determination regarding the environmental suitability of the real estate action; and
- Identify data gaps concerning environmental contamination. The environmental, real estate, and legal professionals may make management decisions to disclose these gaps to the grantee or perform additional investigations to fill the data gaps and reduce potential risk, liability, property use restrictions, or LUCs.

NAVFAC is responsible for preparing the ECP for all leases, easements, and transfers for non-BRAC properties; the BRAC PMO is responsible for all BRAC properties. NAVFAC/BRAC PMO determines the appropriate amount of investigation and documentation based upon the particular circumstances of the real estate instrument and the proposed use of the property. In making this determination, NAVFAC/BRAC PMO needs to consider changes in current use, type of use, length of use, and potential risk, among other relevant criteria. The investigation and documentation could range from a note in the file saying no further documentation is necessary (through a review of existing environmental studies) to a complete and thorough ECP.

The procedures for preparing an ECP for non-BRAC real estate actions are provided in DON [Policy for Streamlining the Assessment, Documentation, and Disclosure of the Environmental Condition of Property \(ECP\) for Non-BRAC Real Estate Actions](#). This policy outlines procedures intended to reduce cycle time and increase efficiency in executing real estate actions on active DON installations. These procedures are consistent with the BRAC procedures described in DoD [Base Redevelopment and Realignment Manual](#) (DoD 4165.66-M), which are applicable to all BRAC installations.

#### **14.3.3 Environmental Finding of Suitability for Real Property Transaction**

The Environmental FOST/FOSL or Environmental Finding of Suitability for Early Transfer (FOSET) are used to identify and document parcels of land that are environmentally suitable for transfer or lease. As described in the BRRM, before transfer or lease of BRAC property, DON shall ensure that all applicable statutory and regulatory requirements have been satisfied. For matters specifically related to hazardous substances, petroleum products, and other regulated materials (e.g., asbestos) on the property, DON shall prepare a FOST/FOSL summarizing how the applicable requirements and notifications for these substances and materials have been satisfied in order for DoD to provide the applicable CERCLA 120(h)(3) or CERCLA 120(h)(4) covenants (reference (f)).

Although property may receive a FOST/FOSL, DON may continue to have remediation responsibilities after the property is transferred or leased. These may include removal actions, LTM, and/or monitoring of LUCs. The FOST/FOSL shall state that the property is environmentally suitable for transfer or lease and contain a description of any long-term remedies (including LUCs) and responsibilities for their maintenance and reporting. The FOSL documents that the property is suitable for lease in that the uses contemplated for the lease are consistent with protection of human health and the environment, and that there are adequate assurances that all necessary RA has been taken or will be taken after the execution of the lease. The BRAC PMO will prepare the FOST/FOSL. Similarly, a FOSET may be prepared, which allows the temporary deferral of the covenant that all remediation be completed prior to property transfer to expedite the transfer of property.

FOSTs are forwarded for review and comment to the state and, if an NPL site, to EPA. For leases, providing the FOSL to EPA for comment satisfies the consultation requirement of CERCLA §120(h)(3) and 10 USC §2667(f)(2). Although resolution of comments on the FOST/FOSL is desirable, it is not required for transfer/lease.

For non-BRAC real estate actions, NAVFAC prepares the necessary documentation of environmental conditions. As specified in the DON [Policy for Streamlining the Assessment, Documentation, and Disclosure of the Environmental Condition of Property \(ECP\) for Non-BRAC Real Estate Actions](#), the previous DON requirements to prepare an Environmental Baseline Survey and FOSL/FOST for non-BRAC actions have been replaced with the ECP. In preparing an ECP for a non-BRAC real estate action, federal, state, and local regulators shall be consulted as necessary and appropriate (i.e., EPA where parcel involved is part of an NPL site).

#### **14.3.4 Early Transfer Authority**

As ER and cleanup programs progress, opportunities to return contaminated properties to productive use are increasing. ETA gives DoD the opportunity to dispose of environmentally-contaminated property for the purposes of both cleanup and redevelopment faster than traditional transfer methods. DoD currently has surplus property, primarily as a result of military base closures under the BRAC program. Some of this property is environmentally-contaminated, and legally, DoD may not transfer property until all necessary environmental RAs have been taken for hazardous substances. ETA provides an exception to this requirement, authorizing DoD to transfer the property before completing RAs, when certain conditions are met. By executing an early transfer, DoD may transfer the property to a developer who can conduct cleanup and redevelopment activities concurrently, saving time and money. Both DoD and EPA have issued guidance on the implementation of this authority. DoD guidance is provided in the [Early Transfer Authority, A Guide to Using ETA to Dispose of Surplus Property](#).

When an early transfer occurs, ownership of the property moves from DoD to another party. DoD, per CERCLA, retains legal liability but may transfer or assign responsibility for conducting environmental remediation of contamination existing at the time of property transfer. Prior to completing the transfer, the parties will reach an agreement as to whether DoD, the property recipient, or a combination of both parties will finish the post-transfer cleanup. Property transfer using ETA has several advantages over traditional property transfer methods, including the ability to integrate cleanup and redevelopment activities, increase investment in property, place property on local tax rolls sooner, and create jobs and revenue for the community. ETA applies to all federal property but has proven to be especially effective at some closure sites where its application facilitates accelerated property reuse by streamlining the transfer, cleanup, and redevelopment of environmentally-contaminated property.

#### **14.3.5 Property Acquisitions**

In acquiring land, the acquiring DON activity shall conduct due diligence as set forth in All Appropriate Inquiries regulations (40 CFR Part 312). “All appropriate inquiries” is the process of evaluating a property’s environmental conditions and assessing potential liability for any contamination. These regulations specify requirements for conducting inquiries into the previous ownership, uses, and environmental conditions of a property for the purposes of qualifying for certain landowner liability protections under CERCLA. As an alternative, the standards set forth in the ASTM E1527-05 Phase I Environmental Site Assessment Process, can be applied to satisfy the statutory requirements for conducting all appropriate inquiries necessary to obtain protection from potential liability under CERCLA as an innocent landowner, a contiguous property owner, or a prospective purchaser. Additional information is provided on EPA’s [Brownfields](#) and [Land Revitalization](#) websites.

The acquiring activity shall use command or installation funds, not ER,N funds, to perform all investigations as part of the due diligence process prior to land purchase or transfer. The results of this process may find contamination (known contamination) and may miss other contamination (unknown contamination). As DON’s goal is to limit its future environmental liability on property acquisitions, responsibility for both known and unknown contamination, as well as appropriate indemnifications, shall

be incorporated in the purchase agreements and deeds. There are a number of options to address future site contamination based on the source of the property acquisition (i.e., from another service, from another federal agency, from private sector, etc.). Therefore, NAVFAC HQ needs to be consulted during the proposed property acquisition process to ensure the appropriate steps are taken to reduce DON future liability.

The extent of the contamination should be reflected in the appraisal before acquiring a known contaminated site. The [NAVFAC Real Estate Procedural Manual, NAVFAC P-73](#) provides further guidance to DON personnel involved in the sale or transfer of real property.

#### **14.3.6 Indemnification**

Transferees of base closure property who are not PRPs have been afforded additional protection through the National Defense Authorization Act (NDAA) of 1993 (Public Law 102-484; §330), as amended (such protection has been carried through to the NDAA for FY 2005, Title III, Subtitle B); Public Law 102-484; 42 USC §9620(h)(3). §330 of the NDAA of 1993, as amended, which is not technically a part of CERCLA, under certain circumstances, authorizes indemnification of the non-PRP transferee for personal injury and/or property damage that occurred as a result of that same contamination.

Certain real estate contracts may seek approval to include language that provides for indemnification of DON should the transferee's or its subsequent transferee's acts exacerbate existing contamination or release additional contamination to the real property being transferred.

#### **14.4 Off-Installation (Third-Party) Sites Where DON is a Potentially Responsible Party**

An off-installation or third-party site is a private, state, or municipally-owned or operated site that has received DON waste and now requires cleanup under CERCLA. EPA seeks to recover CERCLA response costs for assessments and cleanup from the PRPs or have them fund assessment and cleanup costs.

PRPs include any of the following:

- The present owner or operator of the hazardous waste facility;
- The owner or operator of the hazardous waste facility at the time hazardous waste was disposed;
- Anyone who transported hazardous waste to the facility; or
- Anyone who arranged for disposal at the site.

DoD has no current or past ownership interest at PRP sites but may have a potential liability for cleanup of the site under CERCLA §107(a)(3), 42 USC §9607(a)(3). The military services may fulfill their third party responsibilities by:

- Being actively involved in the steering committee for a PRP-led cleanup; or
- Working with the Environmental and Natural Resource Division of the DOJ to adjudicate or defend a claim for monetary contribution toward remediation of a PRP site.

Under CERCLA, DON may become a PRP to enforcement actions taken to recover costs of cleanups. Although EPA cannot sue DON to recover such costs, non-federal PRPs can; hence, the designation as a "third party."

EPA uses the following procedures to notify and work with PRPs:

- The EPA Regional Office sends a "Special Notice" certified letter to the PRPs. This notification may occur before, during, or after EPA takes any actions at a site. The EPA letter informs PRPs of their

potential liability, provides a list of other known PRPs, and calls for PRPs to do any or all of the following:

- Voluntarily remove their hazardous waste from the site;
  - Provide all available documentation on hazardous waste sent to the site (required by CERCLA);
  - Voluntarily attend a meeting where EPA regional personnel describe the problem and potential liability in more detail; or
  - Indicate a willingness to negotiate settlement for costs incurred by EPA to date.
- The EPA Region encourages PRPs to form a steering committee to undertake studies and site cleanup directly or by using an EPA contractor. The committee determines appropriate division of costs between the PRPs and the means of cost recovery from PRPs who do not participate in the committee; and
  - Where EPA chooses not to recommend PRP steering committee formation or where the committee is unable to reach agreement with EPA, EPA may proceed with the cleanup using the CERCLA Trust Fund and then initiate enforcement litigation against PRPs to recover Trust Fund expenditures.

Under DON policy, the AGC(Litigation)/NLO settles claims against DON for third-party sites (see [DON Environmental Policy Memorandum 02-01; Third Party Sites and Affirmative CERCLA Claims](#)). FECs provide support as coordinated through NAVFAC HQ. If an RPM receives a special notice letter or other communication from EPA (e.g., CERCLA §104(e) information request) suggesting that DON is a PRP at a third-party site, the matter should be promptly discussed with counsel to ensure an appropriate response.

#### **14.5 Recovery of Response Costs**

The DON [Environmental Policy Memorandum 02-01; Third Party Sites and Affirmative CERCLA Claims](#) formally established a DON program to recover response costs resulting from contamination by non-DON parties on or from Navy and Marine Corps lands. The [DERP Manual](#) outlines further requirements for affirmative claims. The AGC(Litigation)/NLO has the lead for coordinating the internal evaluation, pursuit of, and negotiation of such claims under contract, CERCLA, or other applicable legal theories.

**Claim Threshold:** Potential affirmative environmental response claims that are valued at more than \$50,000 are evaluated by AGC(Litigation)/NLO and, if warranted, pursued by DON. Claims of lesser value may still be pursued by other commands through informal negotiations or the exercise of contract authority.

**Case Evaluation:** Commands referring environmental cost recovery or enforcement matters to AGC(Litigation)/NLO shall provide timely support to ensure successful execution of the affirmative claims program. It is important that early coordination with AGC(Litigation)/NLO occur to ensure protection of DON's interests. In addition to coordination of cost recovery and/or enforcement strategy, the following elements need to be specifically addressed as early as possible in the cleanup process:

- Consistency with the NCP;
- Selection and documentation of the appropriate statutory response authority;
- Development of defensible cost documentation, including internal DON direct (payroll, travel), indirect/overhead, litigation support, and contractor/consultant costs;
- Statute of limitations deadlines and/or any other issues that may foreclose recovery;



- Development and preservation of paper and electronic evidence, including contract files if appropriate; and
- Evaluation of the feasibility of a PRP response in lieu of ER,N expenditure.

**Contaminated Sediments:** Consistent with CNO's [Policy on Sediment Site Investigation and Response Action](#) (Ser 453E/2U589601), DON commands will identify, to AGC(Litigation)/NLO, situations where they believe that significant sources of non-federal contamination have contributed to sediment contamination that requires a response action. If DON has expended or is considering spending ER,N funds at such sites, AGC(Litigation)/NLO (with assistance from NAVFAC HQ) determines if an affirmative claim should be pursued against non-federal parties.

**Divestiture of Navy and Marine Corps Real Estate:** When DON is attempting to divest a GOCO facility, transfer a BRAC property, or terminate other federal operations on DON lands, the divesting command shall coordinate its divestiture strategy with DASN(E), the AGC(Litigation)/NLO, and CNO N45 or CMC(LF) (as appropriate) before implementing such strategy if there is a possibility of an affirmative environmental response claim. This is necessary to ensure:

- That cost recovery efforts and divestiture strategies do not conflict;
- That there is appropriate reimbursement of the ER,N account by GOCO operators and other PRPs; and
- That the real estate transfer agreement, GOCO or other contractor termination agreement, and other pertinent documents do not obligate DON or relieve the PRP from legal responsibilities in such a way as to waive or compromise environmental cost recovery claims without appropriate authorization.

**Contract Management Issues:** RPMs who are responsible for DON ERP and facility management programs shall promptly notify real estate and acquisition KOs of potential affirmative environmental response claims against contractor PRPs. This facilitates sound contract management decision making, and helps prevent undue waiver or compromise of the DON's environmental cost recovery claims. It also is intended to assist KOs in properly evaluating allowability of environmental response costs that contractors may attempt to charge back to DON contracts. Environmental and facility managers shall promptly provide KOs any evidence of environmental or related safety violations or releases of contamination to the environment by the contractor PRP that might be relevant to these issues. The AGC(Litigation)/NLO may also possess such information as the result of its case investigations.

## **14.6 Contamination Released by Contractors or Other Permissive Users of DON Lands**

In fulfilling its ER responsibilities, the DON should coordinate its contractual requirements with contractors or other permissive users of DON land/facilities. Failing to effectively coordinate the ER responsibilities between DON and the contractor may result in the contractor submitting a claim under a DON contract, or the DON losing potential claims against the contractor. For similar reasons, it is extremely important for real estate and environmental personnel to coordinate, with AGC(Litigation)/NLO, the scope and manner in which leases and other facility contracts are to be closed out (e.g., precisely describing the limited scope of a contract release or AOC sign-off to allow the contractor to vacate the facility while preserving the DON's environmental claims against the contractor). This requirement applies any time any contractor, GOCO or non-GOCO, occupies or uses a DON facility and there is known or suspected contamination from the contractor's operations.

### **14.6.1 Process to Initiate Claim Evaluation**

The general process to initiate claim evaluation is as follows:

- If the PA/SI recommends additional follow-up work, the KO will immediately notify the contractor or other permissive land user, in writing, concerning contractual responsibilities for cleanup, under DON oversight, at the contractor's expense; the notification letter will be coordinated with AGC(Litigation)/NLO unless protection of human health or the environment does not permit coordination;
- If the contractor or other permissive land user declines to perform or fund the follow-up studies, the command will immediately notify and consult with AGC(Litigation)/NLO and NAVFAC HQ to determine if pursuit of an affirmative claim against the contractor is warranted. The consultation may result in a DON decision that NAVFAC will conduct the work under the DON ERP to prevent undue delay or threat to human health or the environment. ER,N funds will be used, and all costs for the follow-up study will be identified, segregated, and tracked separately for future cost recovery/enforcement actions, if appropriate;
- A similar strategy will be followed for contamination from non-federal, neighboring lands, with the exception that AGC(Litigation)/NLO will lead the initial notification of cleanup;
- Similar scenarios will be followed for any RI/FS and RD/RA including removal actions and interim RAs. DON will pursue cost recovery/enforcement actions against the PRP where appropriate; and
- All response actions (i.e., studies and cleanups) performed at these facilities or sites will be consistent with CERCLA and the NCP. ARs and CIPs will be prepared and maintained for all such facilities or sites.

All timetables associated with CERCLA §120 apply if a GOCO is placed on the NPL, and DON will ensure that these timetables are met.

The FECs will negotiate FFAs for GOCO facilities placed on the NPL. The negotiated and signed FFA should in no way be construed as DON's acceptance of the contractor's/operator's share of the liability for cleanup costs associated with the GOCO site. FECs will consult with AGC(Litigation)/NLO on agreement language that will best protect the DON's cost recovery/enforcement interests and on how to best leverage cooperation with EPA and the state to further these interests.

#### **14.7 Government Owned/Contractor Operated Facilities**

GOCO facilities require special consideration and procedures to carry out ER-type activities. DON's liability and responsibility for cleanup at GOCO facilities is based on its status as the owner of the facility. Past and present contractors usually share this liability, especially if they were owners, operators, or generators at these facilities at the time of disposal. Knowledge of the entire history is important in determining the parties' respective liabilities.

DON policy requires GOCO contractors to pay for any and all cleanup costs associated with their operation of DON facilities. However, depending on how DON structures the GOCO contract, it is possible that a contractor will contend that the contract relieved the contractor from environmental liability. AGC(Litigation)/NLO has specialized expertise on these issues.

#### **14.8 Off-Base Contamination**

On occasion, contamination from a DON installation may migrate off the installation. CERCLA § 104(e) permits reasonable access to properties that may not be owned by DON for the purposes of inspecting real property that may have been contaminated as a result of substances migrating from a DON installation (42 USC §9604(e)).

The legal right of entry for the purpose of investigating contamination of off-base sites can be handled in a variety of ways to include:

- The FEC can approach the landowner and seek permission to perform the required investigations. This may require issuance of a real estate instrument or potentially require payment if the land owner will not allow free access; or
- The FEC (RPM, counsel, and real estate) will coordinate DOJ assistance to either condemn a right of entry or provide a compliance order allowing access and entry.

In either case, the FEC real estate and legal counsel must be involved once it is determined that a right of entry onto adjacent land is necessary to determine the extent of contamination.

Considerations for off-base access shall be taken into account when entering into FFAs and agreeing to timetables for completion of work. The FEC CO or NAVFAC HQ will review and sign the ROD and DDs involving the cleanup of contamination on land that is not controlled by DON but which is DON's cleanup responsibility. In cases where the BRAC PMO is involved, the BRAC PMO will sign the ROD/DD.

#### **14.9 CERCLA Citizen Suit Provisions**

CERCLA provisions allow citizen suits against any person or federal agency to enforce the requirements of CERCLA (42 USC §9659). Suits can be brought under either of two provisions, depending whether they allege:

- A violation of any standard, regulation, condition, requirement, or order which has become effective in accordance with CERCLA including any provisions of CERCLA §120, 42 USC §9620 regarding federal facilities (§9659(a)(1)); or
- A failure of an officer of the U.S. to perform any act or duty imposed by CERCLA, including under §120 (42 USC §9620) as well as other Presidential duties delegated by EO 12580, which are not discretionary (§9659(a)(2)).

For §9659(a)(1) and (a)(2) citizen suits, prior to filing suit, the plaintiff must provide a 60-day notice to the EPA Administrator and/or other federal agency against whom the violation is alleged ((a)(1)) or against whom the suit is otherwise brought ((a)(2)), as well as the relevant state for (a)(1) suits. In addition, (a)(1) suits are completely precluded if EPA is diligently prosecuting an action under RCRA or CERCLA against the violator to require compliance.

Further, CERCLA §113(h) (42 USC §9613(h)) bars a CERCLA citizen suit if it is posing a "challenge" to a removal or remedial action taken under CERCLA §104 (42 USC §9604) or §106 (42 USC §9606) authority until the action is complete. If a removal is complete but is to be followed by a remedial action, then a federal court may not entertain the suit, until after the remedial action is complete. Similarly, if a citizen suit complaint alleges that a removal action is in violation of CERCLA but is to be followed by a remedial action, then no suit on the alleged violation is permitted is to be undertaken until after the remedial action.

An installation should immediately notify the chain of command, the appropriate FEC, and the AGC(Litigation)/NLO if it receives a notice of intent to sue. During the 60 days following the notice of intent to sue, DON personnel should identify relevant facts and information for use in negotiation or litigation, whichever occurs first. Additional guidance is provided in [OPNAV M-5090.1](#) and [MCO P5090.2A](#).

#### **14.10 Integrating Natural Resources and Environmental Restoration Activities**

Cleanup activities have the potential to adversely affect natural, cultural, and human resources, both directly and indirectly. These potential impacts include such resources as wetlands, coral reefs, essential

fish habitat, endangered species and other sensitive biological species and habitats, archeological and historical resources, air quality, water quality, traffic and access, coastal zone concerns, public safety, and local community sensitivities.

Natural resource management in the DON ERP includes ensuring that such resources are appropriately accounted for during the planning and execution of all phases of the DON ERP, transfer of real property; granting of leases, and base closures. For many of the resources likely to be encountered, environmental laws and policies are available to consider and/or comply with, depending on the type of cleanup program and the type of impact. The principal laws and policies include: ESA, NHPA, ARPA, NAGPRA, CWA (especially §404 and §401), the Coastal Zone Management Act, the Migratory Bird Treaty Act, the Magnuson-Stevens Fishery Conservation and Management Act, EO 13089 Coral Reef Protection, EO 13158 Marine Protected Areas, and EO 12898 Environmental Justice.

In addition, as specified in the NCP, a risk assessment, including an ERA, must be conducted as part of the RI to determine the need for a RA. ERAs evaluate the likelihood that adverse ecological effects may occur as a result of exposure to one or more stressors, including the presence of hazardous substances in environmental media. Selected remedies should avoid or minimize any additional NRI that may occur during cleanup of a site. NRD claims should only be brought after all remediation at a site is complete. At that time DON should share the ERA with claimants upon request. NRD claims generally must be brought within three years of completion of all remediation at a site. If an NRD claim is filed, consult OPNAV N45. While there is no prohibition against engaging in or participating in NRDA in ER of historical contamination, ER,N and BRAC funding must not be used to conduct NRDA, whether the resource is owned by the DON or another party. If the RA selected has an element that addresses NRI, it shall be specifically stated in the ROD. This provides documentation of the DON attempt to restore the natural resource, in the event that an NRD claim is filed against the DON. CNO's [Policy on Natural Resource Injury and Damages in the Installation Restoration Program](#) provides more information.

RPMs should consult with their facility environmental planners and legal counsel when reviewing the environmental laws and regulations discussed above and for gathering input regarding such resources of concern. The facility or FEC Natural Resources Coordinator can provide detailed information about natural resources that regional or natural resources trustees may not know about. This information can prove invaluable to RPMs in avoiding controversial issues such as endangered species and wetlands. By involving the Natural Resources Coordinator early in the process, remediation and restoration activities can be used to benefit both programs to enhance, restore, and/or create habitats.

#### **14.10.1 Natural Resource Trustees**

Natural resource trustees are responsible for the Natural and Cultural Resources Management Program within the federal government. These federal trustees have statutory responsibilities with regard to protection or management of natural resources, or stewardship as a manager of federally-owned land. State agencies and Indian tribes are also trustees.

CERCLA designates the President as the “trustee” for all federally protected or managed natural resources on behalf of the public. The President, by issuing EO 12580 and following the NCP, designated DoD as the natural resource trustee for all DoD facilities. ASN (EI&E) retains the authority to act as the natural resource trustee for the purpose of recovering damages to natural resources under the jurisdiction of DON. As specified in 40 CFR Part 300.615, the DoD’s responsibilities as the natural resource trustee in the ER process include:

- Establishing appropriate contacts to receive notifications of discharges or releases;

- Conducting a preliminary survey of the area affected by the discharge or release to determine if trust resources under their jurisdiction are, or potentially may be, affected;
- Providing support in coordinating assessments, investigations, and planning;
- Providing for natural resource expertise in contingency planning; and
- Planning and implementing any plans to restore, rehabilitate, replace, or acquire equivalent natural resources.

Natural resource trustees also include the National Oceanic and Atmospheric Administration, state agencies, and the U.S. Department of the Interior. Where there are multiple trustees, because of coexisting or contiguous natural resources or concurrent jurisdictions, they should coordinate and cooperate in carrying out these responsibilities.

#### **14.10.2 Historic and Archeological Resources Program**

DON's Historic and Archeological Resources Program (HARP) is based on the NHPA, 16 USC §470, and the ARPA, 43 CFR Part 7. ARPA prohibits the excavation, removal, damaging, alteration, or defacement of archeological resources on federal property without a permit. "Archeological resources" are identified as any material remains of past human life or activities which are at least 100 years old and which are of archeological interest (32 CFR Part 229). Although the ARPA permitting process does not apply to excavations performed by the DON itself under CERCLA, the §106 process of the NHPA does apply (i.e., work must be conducted in accordance with the substantive requirements of HARP to manage ecological resources, but an ARPA permit is not required).

## Chapter 15

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### Records, Reporting, and Information Management Systems

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Legal and regulatory requirements include the establishment, documentation and management of CERCLA AR files, post decision files, SFs and public information repositories. DON ERP uses information management systems to track progress and manage site data, including incurred and projected costs and schedules. NAVFAC developed NIRIS to consistently manage and maintain the CERCLA AR file, post decision file and SF.

#### 15.1 Administrative Record Files

The AR file is the collection of all documents that lead up to and support the decision in a ROD/DD and form the basis for the selection of a particular response at a site. Documents that are included are those that were relied upon in selecting the response action, as well as relevant documents that were considered but ultimately rejected. Typical remedial and removal documents included in the AR file are provided in Appendix B of the NAVFAC [Environmental Restoration Program Recordkeeping Manual](#). An installation must have all RODs/DDs signed for every site on the installation before the installation AR file can be closed. Once closed, it becomes an AR.

##### 15.1.1 Creating an Administrative Record File

CERCLA §113(k)(1) requires that, as part of public participation requirements, an AR file be maintained for every installation where response actions are underway. A copy of the AR file must be made available to the public at a location near the cleanup site. A notice of the availability of the AR file must be made public.

DON compiles one AR file for each installation under its area of responsibility. A single AR file for each installation is maintained regardless of the number of response actions undertaken at the installation.

The AR file is compiled for two reasons:

1. Pursuant to CERCLA §9613(k) and (j)(1), DON shall use the AR file as a vehicle for public participation in selecting a response action and the sole source of documentation for defending the selection of a response action; and
2. Pursuant to CERCLA §9613(j)(1), judicial review of any issue concerning the adequacy of any response action is limited to the contents of the AR. It is critical that DON takes great care in compiling the AR.

Additional information about AR files can be found at the following links:

- EPA [Revised Guidance on Compiling Administrative Records for CERCLA Response Actions](#);
- NAVFAC [Environmental Restoration Program Recordkeeping Manual](#);
- DoD [Defense Environmental Restoration Program \(DERP\) Management Manual](#);
- [Comprehensive Environmental Response, Compensation and Liability Act \(CERCLA\) of 1980, Section 113\(k\) \(42 USC §9613\(k\)\)](#);
- [Superfund Amendments and Reauthorization Act \(SARA\) of 1986](#); and
- [EO 12580 Superfund Implementation](#).

Response actions requiring an AR file and the timing of making it available to the public are defined by [Final Guidance on Administrative Records for Selecting CERCLA Response Actions](#) (OSWER Directive 9833.3A-1):

- **Remedial Actions:** The AR file for an RA shall be established and available for public review when the RI begins;
- **Time Critical Removal Actions:** The AR file for TCRAs shall be established and available for public review no later than 60 days after the initiation of on-site removal activity. If an on-site removal activity is initiated within hours of the verification of a release or threat of a release and on-site removal activities cease within 30 days (emergency actions), the AR file need only be available at a central location but still no later than 60 days after initiation of on-site removal activity; and
- **Non-Time Critical Removal Actions:** The AR file for NTCRAs shall be established and made available for public review when the EE/CA is made available for public comment.

#### 15.1.2 Responsibility for Establishing and Maintaining the Administrative Record File

Under CERCLA, the lead agency, DON, is responsible for establishing and maintaining the AR file (40 CFR Part 300.805). DON has the lead responsibility for CERCLA response actions at its facilities pursuant to EO 12580. When DON facilities are listed on the NPL, NAVFAC must provide EPA with a copy of or access to the index to the AR file, along with other key documents (40 CFR Part 300.800).

NAVFAC must maintain a copy of the CERCLA AR file at or near the facility where the response action is occurring. Making the AR file available via the NAVFAC public portal website meets this requirement. Additionally, the AR file must be maintained at a central location which includes storage at a Federal Records Center. To ensure that the AR file is accessible by the public, it must be located where security clearance is not required (see EPA [Final Guidance on Administrative Records for Selecting CERCLA Response Actions](#) [OSWER Directive 9833.3A-1]). EPA [Revision to Increase Public Availability of the Administrative Record](#) amended the NCP 40 CFR Part 300.805(c) to broaden the technology the lead agency is permitted to use to make the AR file available to the public, to include computer telecommunications or other electronic means.

The AR file should be compiled as relevant documents related to the response action are generated or received. All documents which are clearly relevant and non-privileged shall be placed in the AR file, their metadata entered into NIRIS, and the PDF version of the document uploaded to NIRIS.

Final documents that are part of the decision-making process should be added to the AR file. Draft documents should be included only if they contain information that forms the basis of the response action selection, the information is not included in any other document in the AR file, or the draft version of the document is the final version. The AR file should include any public comments addressing the choice of remedy generated by the PP and DON's response to those comments. Documents pertaining to multiple installation sites should be added to the installation AR file only once. If questions arise, the matter should be referred to the appropriate DON office of counsel. Technical literature or portions of technical literature that are considered or relied on in selecting a response action and are not publicly-available should be included in the AR file for that response action.

AR File documents that contain sensitive information are flagged in the NIRIS Environmental Document Management System, made available to appropriate personnel, and protected from public view. The NAVFAC public portal web pages display the document information to the public but, in lieu of the document, display a message to contact the appropriate PAO. If the document contains a sensitive section or page, the non-sensitive information can be segregated from sensitive and released to the public as

determined by the PAO and/or counsel. Table 15-1 provides the list of documents typically included in an AR file. Information in the table is meant to serve as a guide and should not be considered all-inclusive.

**Table 15-1 Typical Administrative Record File Documents**

<b>PA, SI, RI/FS, EE/CA, and ROD documentation</b>	Work plans, work plan amendments, SAPs, QAPPs, HASPs, FSPs, chain-of-custody forms, raw analytical data, data summary sheets, QC plans, inspection reports, Uniform Hazardous Waste Manifest, data submitted by the public, supporting technical studies, treatability studies, HHRA, ERA, EE/CA notice of availability, ROD/DD, amendments or ESDs to ROD/DD, and other reports (as available for public comment and as final, if different versions)
<b>RCRA CA and waste management documentation</b>	RCRA permit applications, inspection reports, RCRA Facility Assessment, RCRA Facility Investigation, Corrective Measure Studies, and responses to RCRA information requests
<b>Site Evaluation documentation</b>	Work plan, SAP, QAPP, HASP, FSP, and risk evaluation/endangerment assessments and underlying documentation
<b>Guidance documents</b>	Site-specific guidance required, general guidance may be included, and selected other federal agency documents (EPA, ATSDR, etc.)
<b>Regulatory agreements and correspondence</b>	Administrative Orders and Consent Decrees*, FFA and FFRSA**, SMP, notice to regulators requesting identification of ARARs and regulatory responses; comments on draft, draft final, and final documents and response to comments; Documentation of state involvement; and regulatory concurrence or non-concurrence correspondence on final documents
<b>RA documentation</b>	Technical literature used to consider RAs, and Proposed RAWP and fact sheets or summary information regarding RA alternatives, AM, and AM Amendments
<b>Community involvement documentation</b>	CRP(s) and CIP(s); newspaper articles showing general community awareness; letters forwarded to persons on the community involvement mailing list, including associated data and mailing list for each document; newspaper notices (extracted from the newspaper) from each publication carrying the notice on each date published); public comments and DON responses to significant comments received from the public; transcripts and/or documentation of public meetings and documentation of substantive oral comments on the selected remedy; and RAB meeting minutes, agendas, and presentations
<b>Site-specific correspondence</b>	Responses to CERCLA §104(e) information request letters, Congressional correspondence, Natural Resources Trustee notices and responses, Findings of Fact and Responsiveness Summary, notice letters to PRPs and their responses
<b>Other site-specific documentation</b>	Site-specific APP, memorandums on site-specific or issue-specific policy decisions, and site photographs/maps

\* Enforcement documents (Administrative Orders and Consent Decrees) are included ONLY if they are relevant to selection of a removal action.

\*\* FFA and FFSRAs are filed in the AR file; post decision documents which are required in accordance with the FFA or FFSRA are filed in the post decision file.

AUTHORITY: Revised Guidance on Compiling Administrative Records for CERCLA Response Actions



## 15.2 Post Decision Files

The post decision file is a collection of documents generated or received after a response action is selected and a CERCLA DD is issued. They are not relevant to the response decision and should not be included in the AR file. Examples of post DDs include RD plans and reports, RACRs, five-year reviews and subsequent review documents, LTM information and reports, and LUC RDs. Refer to Appendix B of the [NAVFAC Environmental Restoration Program Recordkeeping Manual](#) for a more complete list of documents for post decision file inclusion.

There are some instances when the post DD information should be added to the AR file, including the following situations:

- When a DD does not address a portion of the decision or reserves a portion of the decision to be made at a later date. An example of this is a DD that does not resolve the type of treatment technology. In such cases, the documents that form the basis for the unaddressed or reserved portion of the decision should continue to be added to the AR file; or
- When there is a significant change in the selected response action. Changes that result in a significant difference to a basic feature of the selected RA (e.g., timing, ARARs), with respect to scope, performance, or cost may be addressed in an ESD. If an RA is taken that differs in any significant respects from the final plan, an ESD is required. The AR file should include the ESD, underlying documentation for the response action changes, any significant comments from the public, and DON responses to any significant comments.

### 15.2.1 Public Availability

Post decision files are not generally openly available to the public. Some post decision files may be available in the AR or information repository, or both. A member of the public must submit a Freedom of Information Act (FOIA) request for desired documents or information to the DON FOIA Office for review and release approval.

RD plans and reports, RACRs, five-year reviews and subsequent interval year review documents, LTM information and reports, LUC RDs, and associated public notices are considered public documents even though they are published after the DD. These documents are placed in the post decision file and declared public documents.

### 15.2.2 Reopened Remedy Documents

If the protectiveness of a remedy is in question, the DON may need to reopen a remedy after a ROD/DD for the site is in place. Until a remedy is reopened, post-ROD/DD correspondence should be included in the post decision file. If a remedy is reopened, the reopened site documents are placed in the AR file.

## 15.3 Site Files

The SF is a collection of documents applicable to the remediation or response action, but not included in the AR file because the documents may be irrelevant to the selection of the response action, were not considered or relied on in selecting the response action, or are beyond the scope of the AR file.

SFs can include documents or portions of documents with information that is considered "sensitive". Some examples are archaeological information, attorney work products, personal information protected by FOIA Exemption 6, general guidance documents, and technical source documents. Relevant guidance documents, applicable laws and statutes, and technical source documents that are publicly-available should be placed in the SF. SF documents may be available to the public if requested under FOIA. Refer

to Appendix B of the NAVFAC [Environmental Restoration Program Recordkeeping Manual](#) for a more complete list of documents that should be included in the SF.

#### **15.4 Resource Conservation and Recovery Act Documents**

For actions at past hazardous waste sites on non-NPL RCRA permitted facilities that are being characterized or remediated under RCRA, a RCRA Document File is usually established and maintained by the state or EPA. RPMs should ensure that the RCRA Document File is being kept by the state or EPA and that it meets CERCLA requirements. When a RCRA site is officially moved to the DON ERP, RCRA documents and records should be reviewed by appropriate personnel and a decision made on which documents to add to the AR file.

#### **15.5 Information Repository**

The Information Repository, usually located at a public library (called the physical repository), is established in the community at the beginning of site studies to provide the public with easily accessible information. Public libraries are often used as the physical repository because they typically have handicapped access, are open in the evening and on weekends, and have copying facilities available. Other locations can include city halls and municipal offices. Any document containing technical site information or non-technical descriptive information can be included in the Information Repository. The EPA [Revised Guidance on Compiling Administrative Records for CERCLA Response Actions](#) defines an Information Repository as a place “where current information, technical reports, and reference materials relating to ER sites are housed.”

DON is responsible for establishing, maintaining, and determining the types of documents to be placed in the Information Repository. The integration of community involvement activities with the use of the repository is a key element of the CIP. The following list provides examples of documents recommended for inclusion in the Information Repository:

- AR file index;
- IAS;
- PA/SIs;
- RI/FSs;
- PPs;
- Response to significant public comments on PP (do not include the public comments);
- Signed RODs/DDs;
- RDs/RAWPs;
- CIPs (formerly known as CRPs);
- RAB meeting minutes (minus sign-in sheets) and presentations;
- Newspaper articles and public notices (original full tear sheets from each publication for each date published; tear sheets must include printed name of publication and date published);
- Technical Assistance Grant (TAG) information;
- ER brochures and fact sheets;
- Installation-specific brochures and fact sheets;
- Copies of press releases (consult with PAO);

- Installation photographs (consult with PAO); and
- Notice of proposed delisting of a site from the NPL.

Further information on developing an Information Repository can be obtained from EPA's [Community Involvement Guidance and Publications](#) website and [Superfund Community Involvement Handbook](#).

The NCP requires that an Information Repository be established for all RAs and any removal actions that exceed 120 days. DON guidance recommends establishing an Information Repository for all sites where cleanup activities are expected to last more than 45 days. The complete AR file or selected documents of public interest for the activity can be placed at a physical Information Repository. The AR file index is always included in the Information Repository. The documents and index can be provided to the Information Repository via electronic media. Contact the local Information Repository regarding any restrictions they may have on the use of outside electronic media on their computer equipment.

## **15.6 CERCLA and DERP Reports**

DoD is required to provide detailed information to the President, Congress, and regulatory agencies about its environmental program to ensure compliance with budget and legislative requirements. DON uses NORM to track and report the status of ER site cleanup, and submit budget requirements for future years.

It is important for all DON ERP participants to document the steps of their response process, including requested and completed interactions with EPA, state and local governments, and local communities. ASD(EI&E) compiles a number of public reports from DON information and provides this information to Congress, EPA, regulatory agencies, and other interest groups.

The following subsections describe reports and information systems supporting the DON ERP.

### **15.6.1 Release of Hazardous Substances Reports**

CERCLA §103(a) and 42 USC §9603(a) require the CO of an installation to immediately report the discovery of a hazardous substance release on their installation. The release of a reportable quantity must be reported to the National Response Center (telephone 800-424-8802). The reportable substances and their released limits in a 24 hour period are provided in 42 USC §9603(a) and 40 CFR Part 302.1. The CO will notify appropriate federal and state regulatory agencies of the release as required. [OPNAV M-5090.1](#) and [MCO P5090.2A](#) describe the responsibilities for release response for the Navy and Marine Corps, respectively. Details regarding hazardous substance report submissions are located in the NAVFAC BMS.

### **15.6.2 Potential Release of Hazardous Substances Reports**

CERCLA §103(c) and 42 USC §9603(c) require the submittal of a notification report to EPA of the existence of any site where hazardous substances may have been stored, treated, or disposed of, and from which there could potentially be a release.

### **15.6.3 Annual Report to Congress**

In accordance with 10 USC §2711 and 42 USC §9620(e)(5), DoD submits an Annual Report to Congress detailing the status of each installation involved in the DERP during the previous year. The DoD Annual Report to Congress reports information on ER from all components (Air Force, Army, DLA, Navy, and Marine Corps). The report is prepared in the first and second quarters of each FY with submittal to Congress and distribution to states and the public at the end of the second quarter.

NAVFAC is responsible for coordinating DON input to the Annual Report to Congress. NAVFAC submits data to DoD from the NORM database along with other information. It is important that the RPM updates NORM data on a regular basis to maintain accurate records of DON ERP activities and ensure that data used to prepare the report are current.

## **15.7 Information Systems for the Environmental Restoration Program**

This section describes how DON manages ERP data using the NORM and NIRIS databases, and how these systems integrate with other DoD and DON centralized data management systems (e.g., Restoration Management Information System and GeoRepository) to report on progress of the DON ERP, establish budgets, and hold various other relevant information.

### **15.7.1 NAVFAC Normalization of Environmental Data Systems**

NORM is a web-based computer system that performs environmental site registration, cradle-to-grave tracking, relative risk ranking, cost-estimating, budgeting, and reporting functions for the DON ERP. NORM stands for normalization of data. NORM integrates and centrally maintains the information necessary to manage the program including site and activity data, site risk ranking and prioritization, and site costs. Through NORM, individual budget requirements are incorporated into the overall FEC program budget, and ultimately into the total NAVFAC budget.

NORM data supports program management and metrics, and many BRAC and ER,N reporting requirements, including:

- Defense planning goals;
- Annual Report to Congress;
- In-progress reviews;
- Budget exhibits;
- The financial statement;
- Financial Management and Budget, OSD, and President's budgets; and
- Answers to Congressional and OSD inquiries.

Each FAC or FEC maintains and administers its own DON ERP data on an ongoing basis using the centralized database. Several integrated components comprise the functional elements of NORM. Each year, NAVFAC issues budget guidance that RPMs follow for submitting project information in the various NORM modules. Each of the NORM modules is described below. Details regarding NORM modules, training, and budget submission guidance are located in the NAVFAC BMS.

#### **15.7.1.1 NORM Activity Editor and NORM Site Editor Modules**

These two components capture general information that categorizes activities and sites. The activity editor captures installation level information, including a listing of all the sites within the activity and points of contact. The site editor captures site level information such as applicable statutes that require site cleanup, and ER,N or BRAC funding designation.

#### **15.7.1.2 NORM Relative Risk Module**

This component uses the DoD RRSEM to rank and prioritize each IRP site as high, medium, or low based on site information including levels of contamination, evidence of migration pathway, and presence of receptors that might be harmed. More information regarding the RRSEM is presented in Section 4.3.

#### **15.7.1.3 NORM Munitions Response Site Prioritization Protocol Module**

The MRSP Module provides a similar function to the NORM Relative Risk Module, but is specific to MR sites. It uses hazard evaluation models to assign a relative priority for MR actions based on the overall conditions at the MRS. More information can be found in Section 4.3.2 and in the [DoD MRSP Primer](#).

#### **15.7.1.4 NORM Cost-Estimating/Scheduler Module**

This component manages budgetary cost estimates for the entire cleanup of the site. The CTC should be updated with more detailed estimates as they become available from other sources such as the FS or RD. The scheduler module is integrated within the cost estimating module to allow the RPM to schedule tasks and indicate the portions of the total estimated CTC costs that are required for each FY.

#### **15.7.1.5 NORM Budget Module**

Budget planning and preparation in NORM begins with three major elements:

- Prioritization of sites – accomplished through the RRSEM and MRSPP;
- Estimation of site CTC – accomplished in the CTC cost-estimating module; and
- Scheduling of program requirements – accomplished through the integrated scheduler module.

The budget module summarizes the information provided through these modules and other modules into an integrated budget for each FEC, and ultimately for all of NAVFAC.

#### **15.7.1.6 NORM Optimization Module**

This module tracks optimization measures in all phases of a site cleanup, including:

- Remedy evaluation and selection;
- RD;
- RA-O;
- LTM; and
- LTMgt.

RPMs plan for these optimization study efforts in the CTC and project schedule.

### **15.7.2 DoD Knowledge Based Corporate Reporting System**

The Knowledge Based Corporate Reporting System (KBCRS) is a centralized repository for information on DoD's ER activities at military installations. The information in KBCRS is used by DoD to provide status on the DERP and to prepare DoD's Annual Report to Congress. The KBCRS data fields are included in the NORM database. At the end of each FY, NAVFAC forwards data from the NORM database to DoD for incorporation into the KBCRS.

### **15.7.3 Naval Installation Restoration Information Solution**

Whereas NORM focuses primarily on the program level budgeting and scheduling data for ER sites, NIRIS is a centralized information management system, developed by NAVFAC, to manage, store, share, and analyze detailed DON ERP data including:

- Environmental sampling and analytical results;
- MEC data;
- Radiological data;
- ER documents (e.g., AR files, SFs);
- LUC data; and
- Spatial ER data (e.g., ER site boundaries).

NIRIS uses an underlying database structure for data and document management that provides standardization and consistency across the program. It is DON policy that all ER data and documents (records) reside in NIRIS (see [Environmental Restoration Program Implementation of the Naval Installation Restoration Information Solution \(NIRIS\)](#) [NAVFAC Instruction 4715.1]; and [Policy for BRAC Program Implementation of the Naval Installation Restoration Information Solution](#) [5090 BPMO 08/05]).

Information on how to access NIRIS can be found in the NAVFAC BMS. The NIRIS website is located at: <https://niris.navfac.navy.mil/se/nirisportal/>. The system is comprised of four main parts that are discussed in the remainder of this section.

**NIRIS Central Data Repository:** The bulk of NIRIS data is stored in central databases. Those items that can be represented spatially, such as sampling data, are stored in a relational database for access by the GIS (mapping) and data query tools. The centralized document storage database services both the AR, which is available to everyone, and the SF, which is only available to RPMs.

**Data Submission Tools and Operating Instructions:** The NIRIS Electronic Data Deliverable (NEDD) specifications standardize the data submittal requirements across the DON ERP, ensuring accurate and complete deliverables. NEDDs are submitted to DON using the web-based Data Checker. The Data Checker ensures that all business rules are adhered to, and compares submittals against the NIRIS database to flag errors. SOPs, guides, and templates are available on the NIRIS website to assist with preparing and submitting NEDDs using the Data Checker.

**Data Administration Tools and Operating Instructions:** NIRIS Regional Data Managers (RDMs) use the Data Administration Tools to manage, maintain and analyze the data within the database. Operating instructions, detailed SOPs, and guides are available on the NIRIS website to all system users. These documents describe how to use NIRIS and these associated tools:

- The Provisioning Tool processes user requests for NIRIS access and provides the ability to adjust user privileges.
- The Data Loader is a tool to load only the NEDDs that have successfully passed through the Data Checker;
- QA reports allow the RDMs to assess the quality of the data loaded; and
- The NIRIS Forms Tool allows for quick editing of data if simple changes need to be made.

**End User Data Management, Analysis, and Visualization Tools:** In addition to storing data, documents, and records, NIRIS provides web-based access to data management, analysis, and visualization tools.

- An electronic document management system lets records managers create document information and manage AR, SFs, and post decision files;
- An ER Search allows users to search, view, and download ER documents (records);
- A query tool provides quick access to installation data;
- Collaboration tools allow users to manage working versions of documents, comment on draft versions electronically, and collaborate online with other members of the team using web conferencing;
- A Document Review Tool provides one location to manage review processes for the SAP, RAA, ESS, and Partnering Team documents;

- The LUC Tracker tool helps manage, maintain and track LUCs established as part of a remedy. This module provides query capabilities, automatic reminders when it is time to perform an inspection, and contains forms to document the inspection and any corrective actions taken;
- A VI Evaluation Tool helps RPMs make high-level decisions with respect to VI at their sites;
- GIS mapping tools provide search, view, environmental sampling data analysis, and LUC boundaries associated with ER sites; and
- A Technical Support Tracking Tool for NAVFAC Echelon III organizations tracks technical support requests received from the FECs.

## **15.8 Business Management System**

NAVFAC's BMS is the source for consistent business processes, practices and resources. It provides information for sharing best practices and serves as a foundation for improving performance across NAVFAC. The NAVFAC BMS contains important resources such as regulations, templates, forms, and links to other NAVFAC tools such as ieFACMAN. Each BMS documents how work is to be done and who is responsible for each step in the process. The [NAVFAC BMS](#) is on the NAVFAC Private Portal. On the BMS home page, select the desired process from a business/support line or functional area. Each process group is accessible via a link on the BMS home page.

## **15.9 ieFACMAN**

The ieFACMAN system is a NAVFAC-wide execution and tracking system for business line product efforts. Two project management tools (e.g., eProjects and eContracts) located within the ieFACMAN system are used to plan and manage yearly execution for contract and in-house environmental efforts. The ieFACMAN system is used for processing and managing work, tracking project and contract action status, and reporting metrics at multiple levels (PW, FEC, and HQ) within NAVFAC. Access to ieFACMAN is obtained via the NAVFAC Private Portal eTools, or <https://iefacman.navfac.navy.mil>. Training materials on ieFACMAN are found within the application under ieFACMAN support.

## Chapter 16

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### Community Involvement

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Public participation as well as public affairs and community involvement activities are necessary for DON ERP response actions. Community involvement promotes communication between the public and DON concerning the status of remediation at installations. Public involvement is required by CERCLA provisions at specific stages of response actions (42 USC §9613 and §9617). Recognizing the importance of proactive community involvement, DON's community involvement requirements are more comprehensive than the minimum CERCLA requirements. DON responsibilities during the response action process include informing the community of any action taken, responding to inquiries, and providing information about any releases of hazardous substances.

#### 16.1 DON Public Participation Guidance/Community Involvement Plan

DON [OPNAV M-5090.1](#) and [MCO P5090.2A](#) provide public participation guidance. DON public participation requirements are more comprehensive than the NCP. For example, DON requires a formal CIP at all DON ERP sites, whether or not they are NPL sites. (Note that these plans were previously called CRPs.) The CIP is a site-specific strategy for meaningful community involvement throughout the CERCLA cleanup process. CIPs are prepared and implemented on an installation-wide basis rather than for a specific ER action.

A CIP is intended to provide for various levels of community involvement in removal and RAs. The NCP requires community involvement for RI/FS and RD activities as well as on-site removal actions that are expected to extend beyond 120 days from the initiation of on-site removal activities and have a planning period of at least six months prior to initiation of the on-site removal activities. CERCLA requirements for community involvement are included in 40 CFR Part 300.415I for removal actions and 40 CFR Part 300.435(c) for RAs. However, because DON's policy is to prepare CIPs for specific installations rather than for specific actions, the CIP can have additional requirements beyond those specified in CERCLA and, therefore, the RPM should check the installation's CIP to ensure that all requirements are being met.

The CIP is based on information gathered from the community through interviews with local officials, residents, public interest groups, and other interested or affected parties to ascertain community concerns, community information needs, and how or when citizens would like to be involved in the CERCLA process.

DoD and DON recognize community involvement as an ideal method of implementing DoD strategy on environmental justice and to understand the socioeconomic makeup of the populations in and around its installations (DoD [Strategy on Environmental Justice](#) and CNO [Establishment of Restoration Advisory Boards \(RABs\)](#) [5090 Ser 453C/4U596021]). To strengthen and maintain community involvement as a useful tool for these purposes, DoD has directed installations to combine pertinent data gathered from the U.S. Bureau of the Census and various databases maintained by the military departments, defense agencies, local and tribal agencies, and other agencies to ensure that the CIP adequately characterizes the affected community and addresses community needs.

In the CIP, DON specifies the activities it expects to undertake during the response/removal. As CIPs are 'living documents', they should be reviewed and updated periodically as new information becomes available (typically every 3 to 5 years). Prior to initiation of the RD phase, DON reviews the CIP to determine whether it should be revised to describe further public involvement activities during RA that



were not already addressed or provided in the CIP. The contents of the CIP vary depending on project phase but generally should include the following:

- Site history including environmental history;
- Background and history of community involvement at the site including key issues related to specific sites and the overall cleanup effort;
- Scope and objective of the DON ERP;
- Key demographic information about the affected community;
- Community needs, concerns and expectations as identified through community interviews, discussions and interactions with stakeholder groups;
- Community involvement activities to meet the DON ERP objectives; and
- A list of officials, citizen/community groups, and media contacts.

In general terms a CIP provides a means to:

- Inform the public of planned and ongoing actions;
- Provide the public with an opportunity to express comments on and provide input to technical decisions; and
- Identify and resolve conflicts.

Also see the NAVFAC BMS and EPA [Superfund Community Involvement Handbook](#).

## **16.2 Management of Restricted Information**

Release of information under the CIP should focus on issues covered by the CERCLA response process. Public affairs matters outside the area of the CERCLA response process remain subject to other established DON channels for release of information. Any restricted information should only be released subject to the applicable DON regulations regarding release of such information. For example, environmental remediation with potential environmental radiological contamination at installations in the NNPP where nuclear-powered ships were operating or serviced, would require coordination with NNPP (NAVSEA Code 08) prior to release of information.

## **16.3 Restoration Advisory Board**

The DERP provides for establishment of RABs at installations where ER activities are planned or being implemented (10 USC §2705[c] and [d]). RABs are the cornerstone of DoD and DON efforts to expand community involvement in decisions about cleanup at military bases. By bringing together people who reflect the many diverse interests within the community, a RAB can help identify issues of concern and improve overall communication to support project implementation. In addition to providing input on cleanup activities, each RAB acts as a liaison between the community and the installation [DoD Environmental Justice Strategy](#) [pp. 5, 17].

DoD published a regulation addressing RABs called the “RAB Rule” (70 FR 27610). This rule addresses the overall scope, characteristics, composition, funding, establishment, operation, and adjournment/dissolution of RABs. The RAB Rule applies to all DoD RABs regardless of when they were established. More detail can also be found in the BMS.

### 16.3.1 Determining the Need for a Restoration Advisory Board

At installations within the DON ERP, regardless of the cleanup authority (i.e., CERCLA or RCRA), the CO of the installation should establish a RAB where there is “sufficient sustained community interest” in the cleanup program. Regardless of the number of sites, there is only one RAB per installation. One of the following criteria must be met for community interest to be considered “sufficient and sustained”:

- Closure of the installation involves transfer of property to the community;
- 50 citizens petition for a RAB;
- Federal, state, or local government requests formation of a RAB; or
- The installation CO determines that a RAB is needed. To assist the CO in making this determination, the following approaches are used to determine the level of interest in the community for establishing a RAB:
  - Reviewing correspondence;
  - Reviewing media coverage;
  - Consulting community members;
  - Consulting relevant government officials; and
  - Evaluating responses to communication efforts, such as notices in local newspapers.

If an installation has made a good faith effort to solicit community interest and can document that no interest was found, a RAB does not need to be formed. In such circumstances, it is important that the process of identifying stakeholder interest be repeated to ensure that the public is given opportunities to express interest in participating in the installation’s cleanup process. DoD policy is to reassess community interest at least every 24 months. Where the reassessment does not find sufficient and sustained community interest in a RAB, the installation will document the reassessment procedures and findings in a memorandum for the AR file.

TRCs were initially established where practicable at DoD installations to provide interested parties with a forum to discuss and provide input to ER activities. However, as stated in RAB guidance CNO [Establishment of Restoration Advisory Boards \(RABs\)](#) (5090 Ser 453C/4U596021), it is DoD and DON policy to convert existing TRCs or similar advisory groups to a RAB, provided there is sufficient interest within the community. Thus, no additional TRCs are formed. RABs expand the TRC initiative in the following ways:

- RABs involve a greater number of community members than TRCs, thereby better incorporating the diverse needs and concerns of the affected community; and
- Chairmanship of the RAB is shared between the installation’s representative or the RPM and community, promoting partnership and careful consideration of the community’s concerns in the decision-making process.

### 16.3.2 Goals and Functions of a Restoration Advisory Board

A RAB is designed to act as a focal point for the exchange of information between the installation and the local community regarding restoration activities. The purpose of the RAB is to:

- Provide an expanded opportunity for stakeholder involvement in the ER process at DoD installations;

- Act as a forum for the discussion and exchange of restoration program information, addressing the concerns of stakeholders, and effectively reaching key groups and representatives from DoD, regulatory agencies, tribes, and the community; and
- Provide an opportunity for RAB members to review progress and participate in a dialogue with the installation and key decision makers concerning ER matters. DoD representatives will listen, carefully consider, and provide specific responses to the recommendations provided by the individual RAB members.

RABs only address issues associated with ER activities. DoD considers the following types of activities to be within the scope of RAB members' functions:

- Providing advice to the installation, EPA, state regulatory agency, and other government agencies on restoration activities and community involvement;
- Addressing important issues related to restoration, such as scope of studies, cleanup goals, waste management, permits and permit modifications necessary to accomplish site remediation, and RA alternatives;
- Reviewing, evaluating, and providing comments on documents associated with ER activities such as plans, technical reports, and response actions;
- Identifying ER projects to be accomplished in the next FY and beyond;
- Recommending priorities among ER sites or projects;
- Attending regular meetings that are open to the public;
- Interacting with the local redevelopment authority or other land use planning bodies to discuss future land use issues relevant to ER decision making; and
- Providing feedback to other community members on RAB activities and sharing community concerns and input with the RAB.

By establishing a RAB, DoD hopes to ensure that interested stakeholders can actively participate in a timely and thorough manner in the planning and implementation of the ER process. A RAB serves as one method for the expression and careful consideration of diverse points of view.

The COs of the installations or BRAC PMO will establish and conduct periodic meetings of the RAB in accordance with the detailed guidance provided in the [DoD RAB Rule](#) (71 FR 27610).

### **16.3.3 Establishing a Functioning Restoration Advisory Board**

The RAB should be fully functional within six months of determining that a RAB is needed and have procedures in place for the successful development and final implementation of a working RAB. The following items are to be completed to establish or promote an efficiently functioning RAB:

- Selection of RAB members by a selection panel set up by the installation CO or BRAC PMO;
- Training of RAB members;
- Development of a mission statement outlining the overall purpose of the RAB; and
- Development of RAB operating procedures.

### **16.3.4 Selecting Restoration Advisory Board Members**

An important element in the formation of the RAB is the selection of the members. The RAB is comprised of members from the local community and representatives from DON, the state, and EPA (where

involved). Community members selected for the RAB will reflect the diverse interests and concerns of the local community. RAB members should live and/or work in the community or be affected by the restoration program.

Potential candidates for inclusion on a RAB are:

- Local residents/community members;
- Local reuse committees;
- TAG recipients;
- Local government officials and agencies;
- Business community;
- School districts;
- Employees and residents of the installation;
- Local environmental groups and activists;
- Civic and public interest organizations;
- Religious community; and
- Other regulatory agencies.

DON membership should consist of a minimum of two members with the NAVFAC representative serving as a member or as a technical consultant to the RAB and one representative serving as the RAB Co-Chair in coordination with the installation CO. For BRAC sites, the BEC serves as the primary DON liaison with local communities and local redevelopment authorities; therefore, DON membership may include a member from the BRAC PMO.

#### **16.3.5 Training Restoration Advisory Board Members**

Once selected, RAB members require initial training in their duties. DON will work with the state, EPA (where involved), and environmental groups to develop methods to quickly train the new RAB members. The NMCPHC can assist with RAB training, environmental risk communication, and other community outreach activities. Potential training for RAB members may take the form of:

- Formal training sessions;
- Workshops;
- Informal briefings;
- Briefing booklets;
- Past fact sheets;
- Maps; and
- Site tours.

#### **16.3.6 Developing a Mission Statement and Operating Procedures**

Each RAB should develop a mission statement that articulates the overall goals and purpose of the RAB. In addition, the RAB should develop a set of operating procedures to ensure an effective and functioning advisory board. RAB operating procedures should include the following:

- Policies on attendance;

- Procedures for replacing, adding, or removing members;
- Co-Chair selection process and length of service;
- Methods of resolving disputes;
- Definition of sufficient and sustained community interest;
- Process for responding to public comment;
- Procedures for public participation; and
- Procedures for dissolving the RAB.

### **16.3.7 Roles and Responsibilities of Key Restoration Advisory Board Members**

An installation representative or the RPM should serve as the RAB Co-Chair for DON. In certain cases, the RPM may serve as either a member of the RAB or as a technical consultant to the RAB rather than as the Co-Chair, in which case an alternate DON Co-Chair is assigned. The DON Co-Chair is responsible for:

- Coordinating with the Community Co-Chair to prepare and distribute an agenda prior to each RAB meeting;
- Ensuring that DoD participates in an open, honest and constructive manner;
- Attending all meetings and ensuring that the RAB has the opportunity to participate in the restoration decision process;
- Ensuring that community issues and concerns related to restoration are identified and addressed;
- Ensuring that documents distributed to the RAB are in an easy-to-understand format and are also made available to the general public;
- Ensuring that an accurate list of interested and/or affected parties is developed and maintained;
- Providing relevant policies and guidance documents to the RAB to enhance the RAB's operation;
- Ensuring that adequate administrative support is provided to the RAB;
- Referring issues not related to restoration to appropriate installation officials to address;
- Reporting meeting proceedings to the installation;
- Ensuring RAB members receive necessary training; and
- Reporting the requirements for RAB support to NAVFAC HQ, along with other DON ERP budgeting requirements.

The Community Co-Chair is responsible for:

- Coordinating with the DON Co-Chair and RAB community members to prepare an agenda prior to each meeting;
- Ensuring that community members participate in an open, honest and constructive manner;
- Ensuring that community issues and concerns related to restoration are identified and addressed;
- Assisting with the dissemination of information to the general public;
- Coordinating with the Installation Co-Chair to ensure that periodic training assessments are conducted and that training needs are met;
- Reporting meeting proceedings to the community; and

- Serving without compensation.

The RAB community member is responsible for:

- Attending RAB meetings and providing input in an open, honest and constructive manner;
- Providing advice and comment on restoration issues and concerns;
- Representing and communicating community interests and concerns;
- Acting as a conduit for the exchange of information between the community, DON installation, and environmental oversight agencies regarding the installation's restoration and reuse programs;
- Reviewing, evaluating, and commenting on documents and other such materials related to ER and closure activities, if applicable; and
- Serving without compensation.

The state regulatory member and EPA member, where applicable, are responsible for:

- Attending RAB meetings and providing input in an open, honest, and constructive manner;
- Serving as an information, referral, and resource bank for communities, installations, and agencies;
- Reviewing documents and other materials related to restoration;
- Ensuring that state environmental standards and regulations are identified and addressed by the DON installation (state regulatory member);
- Ensuring that federal environmental standards and regulations are identified and addressed by the DON installation (EPA member);
- Facilitating flexible and innovative resolutions of environmental issues and concerns; and
- Assisting in education and training for the RAB members.

Additional information regarding RABs can be found in the [Restoration Advisory Board Rule Handbook](#).

#### **16.4 Department of Defense Technical Assistance for Public Participation**

Opportunities for technical assistance through the [TAPP](#) program are made available to RAB community members in accordance with 10 USC §2705(e). TAPP provides funding for RABs to obtain independent (third-party) technical expertise to assist them in understanding or evaluating technical documents, concepts, or other information related to the restoration activity. TAPP must be requested by a majority of community members on a RAB.

All TAPP requests are approved by the installation CO for eligibility. The installation CO may approve a RAB request for a TAPP if one of the following criteria is met:

- The RAB demonstrates that the federal, state, and local agencies responsible for overseeing ER at the installation level and DoD do not have the technical expertise necessary to achieve the objective for which the technical assistance is being obtained; or
- The technical assistance is likely to contribute to the efficiency, effectiveness, or timeliness of ER activities at the installation, and is likely to contribute to community acceptance of ER activities at the installation.

#### 16.4.1 Applicability of Tasks for Funding

Eligible tasks for TAPP include the following:

- **Interpreting technical documents:** Review ER site investigations, DDs, and engineering plans. Examples include site characterizations, alternative remedy analyses, and health and ecological risk assessments;
- **Assessing technologies:** Assist community members in understanding the functions, tradeoffs, and implications of technologies proposed to investigate or cleanup sites;
- **Participating in relative risk site evaluations:** Assist community members in understanding and contributing to DoD's relative risk site evaluation process;
- **Understanding health implications:** Assist members in interpreting the potential health risks of site contaminants, exposure scenarios, cleanup goals, or remedial technologies; and
- **Training:** Provide technical training on specific restoration issues where the community needs supplemental information (e.g., evaluation of alternative technologies, risk assessment procedures, and sampling plans).

Ineligible activities for TAPP are:

- Payment of attorney's fees, preparation of litigation, or underwriting of any legal actions;
- Political activity or lobbying as defined in OMB Circular A-122, [Cost Principles for Non-Profit Organizations](#); and
- Other activities inconsistent with the cost principles stated in OMB Circular A-122.

More detail on the TAPP can be found in NAVFAC BMS.

#### 16.4.2 Eligible Applicants

Only RAB community leaders are eligible to apply for the TAPP program. The RAB shall be comprised of at least three community members and recognized by DON. They should use DD Form 2749 [Technical Assistance for Public Participation \(TAPP\) Application](#) to apply for TAPP funding assistance. The TAPP program is managed by CNO N45 and is funded from the ER,N account for active bases and the BRAC account for closed bases. Additional information regarding the TAPP can be found at 63 FR 21.

#### 16.5 Environmental Protection Agency Technical Assistance Grants

CERCLA includes provisions to establish a [TAG program](#). The intent of the program is to foster informed public involvement in decisions relating to site-specific cleanup strategies under CERCLA. EPA's CERCLA TAG program provides a grant of up to \$50,000 to community groups to hire technical advisors to help citizens understand and interpret site-related technical information for NPL sites. Congress and EPA established specific requirements and guidelines for recipients of TAGs. Congress also stipulated that only one TAG award may be made per NPL site at any one time.

When EPA places an installation on the NPL, the installation should contact EPA for the appropriate information and guidance on requirements for TAG recipients. This information should be made available to the public through news releases, fact sheets, public meetings, or through any other method deemed to be appropriate, and should be included in the information repository. More detail can be found in the NAVFAC BMS.

## **16.6 CERCLA Requirements**

As noted previously, DON's public participation requirements are more comprehensive than the NCP. Although RPMs must follow the requirements in the installation's CIP, the applicable CERCLA requirements for community involvement also need to be followed. Information and guidance regarding these can be found in [Superfund Community Involvement Handbook](#). This handbook includes graphic timeline representations of the minimum requirements for Superfund community involvement.

## **16.7 Special Considerations for Base Realignment and Closure Sites**

In addition to ER, DoD also considers the possible economic and social effects of installation closure on the local community. When an installation is closed or realigned, DoD understands that the local community will want to return the available property to productive use as quickly as possible.

To facilitate transfer and economic reuse to the local community, DoD strives to conduct ER activities as efficiently and effectively as possible. Economic redevelopment and reuse are the responsibility of DoD's Office of Economic Adjustment (OEA). To work together with OEA, the DoD Cleanup Office created DERP management tools, such as BCTs and local redevelopment authorities, to engage the community in the cleanup and transfer processes. DoD often works with communities surrounding BRAC installations through RABs; however, RABs focus solely on ER issues.

## **16.8 Navy and Marine Corps Public Health Center Support**

NMCPHC routinely provides support for community involvement activities for the DON ERP. As the risk communication SME for DON, NMCPHC can provide support in the following areas:

- Developing/updating CIPs including:
  - Compiling demographic data;
  - Developing interview questionnaires;
  - Researching and compiling interviewee lists representative of the community;
  - Conducting phone and on-site interviews; and
  - Compiling interview data and producing CIPs for publication.
- Assisting with RABs including:
  - Developing site- and topic-specific RAB training as requested;
  - Preparing fact sheets/handouts;
  - Holding "mock" public meetings to help prepare presenters;
  - Developing poster stations for RAB meetings/open houses; and
  - Assessing the need for and executing RAB expansion, membership drives, and identification of stakeholders.
- Assisting with general risk communication requirements including:
  - Identification of stakeholders;
  - Identification of stakeholder concerns/information needs;
  - Development of anticipated stakeholder questions;
  - Development of key messages;



- Selection of appropriate communication channels to convey approved messages to affected stakeholders; and
- Training of project teams to ensure overall success of selected communications strategies.

## Chapter 17

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### Health and Safety

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CERCLA requires the protection of the health and safety of workers engaged in hazardous waste operations and the general public during response actions (42 USC §9651 [f] and §9604 [f]). These CERCLA requirements are implemented through the NCP at 40 CFR Part 300.150, which specifies that actions conducted in accordance with the NCP will comply with the provisions for response action worker safety and health in OSHA standards for hazardous waste operations and emergency response (HAZWOPER) (29 CFR Part 1910.120 and 29 CFR Part 1926.65).

The OSHA rules for health and safety apply to cleanup operations at NPL sites, CAs required at RCRA sites, voluntary cleanup operations, hazardous waste TSD facilities operations, and emergency spill responses. Further, the NCP mandates that the requirements, standards, and regulations of the federal Occupational Safety and Health (OSH) Act and of state OSH laws not directly referenced in 40 CFR Part 300.150 shall be complied with where applicable. Applicable federal OSH Act requirements not specifically referenced in the NCP may include, among other things, general construction standards (29 CFR Part 1926), general industry standards (29 CFR Part 1910), and the general duty requirement of Section 5(a)(1) of the OSH Act (29 USC §654 [a][1]). Finally, the NCP specifies that all governmental agencies and private employers are directly responsible for the health and safety of their own employees.

The DON ERP uses the NCP as the implementing regulations for accomplishing response actions. As such, consistent with the NCP requirements set forth in 40 CFR Part 300.150, ER site activities shall comply with the OSHA standards found at 29 CFR Part 1910.120 and 29 CFR Part 1926.65. Within DON, health and safety are dictated by the DON [Occupational Safety and Health Program Manual](#) (OPNAVINST 5100.23G). The DON also relies on the current edition of the USACE EM 385-1-1 Safety and Health Requirements Manual for health and safety guidance. Specific health and safety requirements, including portions of the HAZWOPER regulations related to typical DON ERP activities, can be found in these manuals and are introduced in this chapter. More detail can be found in the NAVFAC BMS.

In addition, specific SOP requirements exist for operations involving ammunition or explosives. As required by NAVSEA OP 5; Ammunition and Explosives Ashore, Safety Regulations for Handling, Storing, Production, Renovation, and Shipping, a written SOP shall be developed prior to starting any process involving MEC including MPPEH. Guidance for writing SOPs is provided by Standard Operating Procedures Development, Implementation, and Maintenance for Ammunition and Explosives (NOSSAINST 8023.11A) and MCO 8020.10 and applies whether the work is performed by DON or contractor personnel at a government-owned activity or by DON personnel at other activities. OP 5 is not available online; copies of OP 5, NOSSAINST 8023.11A, and MCO 8020.10 can be requested by contacting NOSSA or NAVSEA.

#### **17.1 Health and Safety Roles and Responsibilities**

Although NAVFAC is responsible for the overall health and safety program, health and safety matters are generally administered through the FECs. The RPM coordinates health and safety matters with the designated FEC Safety Manager and the FEAD (in accordance with the NAVFAC BMS). ACOs are responsible for designating the appropriate DON personnel through TO COR letters to ensure that contractors comply with all applicable health and safety requirements during field work.

It is the responsibility of the RPM and the FEC Safety Manager to ensure that all personnel involved in an ER project are adequately and properly trained in accordance with DON requirements and that all DON health and safety practices and procedures are adhered to. The RPM and the FEC Safety Manager are

responsible for reviewing site-specific health and safety documentation to ensure that proposed operating procedures and monitoring are adequate to protect worker health and safety. For environmental construction projects, the FEAD Construction Manager or ROICC is responsible for reviewing the Accident Prevention Plan (APP) and the Activity Hazard Analysis (AHA) portion of the HASP. Assistance with review of HASPs and APPs is also available from the NMCPHC.

DON ERP activities at all sites must be completed by qualified contractors. The contractor is responsible for complying with all federal, state, and local health and safety requirements, as well as meeting the DON ERP health and safety requirements as outlined in the contract. The RPM and FEC Safety Manager will retain organizational and responsibility roles in cooperation with the selected contractor to ensure that ER site activities are conducted in a manner consistent or compatible with DON policy and requirements. The RPM and FEC Safety Manager (and FEAD Construction Manager or ROICC when applicable) will review the contractor's overall health and safety training requirements and policies, and project-specific health and safety documentation to ensure that they are consistent with DON policies and requirements. The contractor will appoint a Health and Safety Manager and a Site Health and Safety Officer (SHSO), and will use properly trained field/site personnel.

If a deficiency in health and safety protocols is noted during implementation of ER project activities, or if a health and safety incident occurs, it is the responsibility of the field/site personnel and/or contractor's SHSO to suspend/terminate site activities. In consultation with the RPM and the FEC Safety Manager, the deficiency or incident will be specifically addressed and resolved before work resumes. If a revised health and safety procedure or practice is required, all necessary documentation will be amended and reapproved in accordance with DON procedures in a timely manner.

## **17.2 Accident Prevention Plan and Site-Specific Health and Safety Plan**

DON ERP projects may require, by contract, that contractors develop project-specific APPs and HASPs in accordance with the current edition of USACE EM 385-1-1 Safety and Health Requirements Manual. The APP is a project (site)-specific document that defines the contractor's health and safety policies and how they will manage the site safety and health program during the contract. Critical parts of the APP are the requirements that site-specific occupational safety and health risks and mandatory OSHA compliance programs be identified and addressed as specific plans in the APP. The HASP is one of several plans that may be part of the APP. HASP applicability is based on the HAZWOPER requirements of 29 CFR Part 1910.120/29 and 29 CFR Part 1926.65 and Section 28 of USACE EM 385-1-1 Safety and Health Requirements Manual. If HAZWOPER is applicable, a site-specific HASP must be developed and included as an appendix to the APP.

The procedures for protecting the health and safety of all personnel working at a DON ERP site or responding to an emergency at the site are to be set forth in a site-specific HASP. This document is prepared prior to an SI, RI, removal and RA field activities, and concurrently with the SAP. Section 28 of USACE EM 385-1-1 Safety and Health Requirements Manual provides the format and content of the site-specific HASP and follows the HAZWOPER content requirements of 29 CFR Part 1910.120 and 29 CFR Part 1926.65. The HASP is written based on the anticipated hazards for the expected working conditions. The HASP contains information about known or suspected hazards; routine and special safety procedures that will need to be followed; and other instructions for safeguarding the health and safety of site personnel, visitors, and emergency responders. In accordance with 29 CFR Part 1910 and 29 CFR Part 1926, each site-specific HASP, which must be kept on-site, shall address the safety and health hazards of each phase of site operation and include the requirements and procedures for employee protection. The site HASP, at a minimum, shall address the following:

- Plan organization;

- Personnel responsibilities;
- Site characterization, hazard and risk identification;
- Site-specific safety and health risk/hazard analysis;
- Employee training;
- Personnel protective equipment (PPE);
- Medical surveillance;
- Exposure monitoring;
- Decontamination;
- Site control/safe work practices and site SOPs;
- Location of nearest hospital to the site, with map;
- Spill containment; and
- Emergency response and emergency action plans.

Before operations at a site commence, all safety aspects of site operations should be examined. During site activities, the plan is reviewed and discussed with all workers, supervisors, contractor and government inspectors, and emergency response personnel by the SSHO, or other designee. As information about the site is developed, the plan is revised to keep it current.

In most cases, the site-specific HASP is prepared by a DON contractor. The RPM coordinates the review and acceptance of the HASP with the FEC Safety Manager and the FEAD Construction Manager/ROICC to ensure that the plan protects the health and safety of the workers. To assist with this review, the RPM can refer to the [Site-Specific HASP Review Checklist](#) and the APP Review Checklist developed by NMCPHC based on [OSHA](#) requirements, the requirements of the USACE EM 385-1-1 Safety and Health Requirements Manual, and the requirements of this DON ERP Manual.

### **17.2.1 Hazard Assessment**

Complete and accurate HASPs are required to prevent exposures to chemical, biological, and physical hazards, and to prevent construction-related mishaps during environmental cleanup projects. As specified in the current edition of the USACE EM 385-1-1 Safety and Health Requirements Manual, for each major task of the environmental project, an HA must be performed for each job step, and proper controls, training, and PPE identified. This HA is documented in an AHA. Section 1 of USACE EM 385-1-1 Safety and Health Requirements Manual provides the format of the AHA. AHAs need to be project-specific and tailored to the contracted tasks that will be performed. Examples of tasks requiring an AHA include (but are not limited to) the following:

- Site mobilization and demobilization;
- Site utilities identification;
- Site surveying;
- Site land clearance (specific activities such as grass cutting, tree and brush removal);
- Site setup;
- Transporting;
- Surveying;

- Drilling;
- Excavation and trenching;
- Any specific treatment technology;
- Soil loading and removal;
- Soil and groundwater sampling;
- Routine maintenance operations (must be task specific); and
- Management of IDWs.

### **17.2.2 Standard Procedures for Munitions Response Program Health and Safety**

Specific SOP requirements exist for activities involving ammunition or explosives. As required by NAVSEA OP 5, Ammunition and Explosives Ashore, Safety Regulations for Handling, Storing, Production, Renovation, and Shipping (Vol. 1, 7th revision), a written SOP shall be developed prior to starting any process involving ammunition or explosives. OP 5 can be requested by contacting NOSSA or downloaded from <http://www.navsea.navy.mil/Home/NOSSA.aspx>.

### **17.2.3 Personal Practices**

EPA [Standard Operating Safety Guides](#) (OSWER 9285.1-03) and the current edition of USACE EM 385-1-1 Safety and Health Requirements Manual recommend the following personal practices:

- Eating, drinking, smoking, chewing gum or tobacco, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in any area designated as contaminated;
- Site sanitation plans should include identification of toilet and bathroom facilities, how potable water will be provided to site employees, and that, at a minimum, hands and face shall be washed upon leaving the work area;
- Contact with contaminated or suspected contaminated surfaces should be avoided;
- Prescribed drugs should not be taken by personnel on response operations where the potential for absorption, inhalation, or ingestion of toxic substances exists unless approved by a qualified physician (medicine may exacerbate the effects of exposure to toxic substances). Working employees should not use or be under the influence of alcohol, narcotics, intoxicants or mind-altering substances; and
- Alcoholic beverages should be avoided in the off-duty hours but especially during response operations (alcohol exacerbates the effects of exposure to toxic substances).

### **17.2.4 Operating Procedures**

EPA [Standard Operating Safety Guides](#) (OSWER 9285.1-03) and the current edition of USACE EM 385-1-1 Safety and Health Requirements Manual, 29 CFR Part 1910.120, and 29 CFR Part 1926.65 provide basic SOPs applicable to ER sites, to include:

- All personnel visiting an ER site will be trained and briefed on anticipated hazards, PPE to be worn, safety practices to be followed, emergency procedures, and communications;
- Any required respiratory protection and chemical protective clothing will be donned by all personnel prior to going into areas designated for wearing protective equipment;

- Visitors entering an exclusion zone/work zone requiring respiratory protection will provide their own respiratory PPE in addition to providing documentation that they are qualified to wear subject PPE;
- No facial hair that interferes with a satisfactory fit of the mask-to-face seal is allowed on personnel required to wear respirators;
- When decontamination procedures for outer garments are in effect, the entire body will be washed as soon as possible after the protective garment is removed;
- Personnel on-site shall use the buddy system when entering an exclusion zone or hazardous area. A minimum of two other persons, suitably equipped, is required as safety backup during initial exclusion zone entry and for emergency response purposes;
- Visual contact will be maintained between pairs of on-site and safety personnel. Initial exclusion zone entry team members should remain close together to assist each other during emergencies;
- At all times while operations are being performed on-site, a minimum of two contractor personnel trained in adult first aid/cardiopulmonary resuscitation (CPR) and blood-borne pathogens control will be available on-site to render emergency care. Personnel designated to provide on-site first aid/CPR shall be assigned and included by name in the site-specific HASP;
- 911 should be contacted if necessary for providing emergency assistance and emergency transport to the nearest emergency room facility;
- Personnel should practice unfamiliar operations off-site prior to performing the actual procedure on an ER site;
- Exclusion zone entrances and exits will be designated and emergency escape routes delineated. Warning signals for site evacuation shall be established;
- Communication using radios, hand signals, signs, or other means shall be maintained between initial exclusion zone entry members at all times. Emergency communications will be prearranged in case of radio failure, site evacuation, or other reasons;
- Prior to commencing site operations, the responsible company official shall establish appropriate communications with all potential emergency response organizations such as the federal On Scene Coordinator, installation CO, Local Emergency Planning Committee, the National Response Center, local poison control centers, and local medical facilities (civilian and military);
- Wind indicators visible to all personnel should be strategically located throughout the site;
- Personnel and equipment in the contaminated area should be minimized consistent with effective site operations;
- Work areas for various operational activities will be established; and
- Procedures for leaving a contaminated area will be planned and implemented prior to going on-site. Work areas and decontamination procedures will be established based on expected site conditions.

#### **17.2.5 Health and Hazard Monitoring**

The site-specific HASP should specify the requirements for health and hazard monitoring during the implementation of ER site activities. Air monitoring will be used to identify and quantify airborne levels of hazardous substances and other health hazards to determine the level of personal protection on-site. Air monitoring shall be conducted to identify any immediately dangerous to life and health (IDLH)

situations. Periodic monitoring will be conducted in accordance with the HASP but at a minimum is recommended when:

- Work begins on a different portion of the site;
- Contaminants other than those previously identified are being handled;
- A different type of operation is initiated; and
- Personnel are handling leaking drums or containers or working in areas with obvious liquid contamination.

Once ER site cleanup operations commence, those personnel with the greatest potential for exposures to hazardous substances shall be monitored.

#### **17.2.6 Personal Protective Equipment**

Anyone entering an ER site shall be protected against potential health hazards. The purpose of PPE is to shield or isolate individuals from the chemical, physical, and biological hazards that may be encountered at the site. The site-specific HASP will include a PPE Program established for the ER site-specific cleanup operations and will address:

- Site conditions;
- PPE selection, use, maintenance and storage, decontamination, inspection, in-use monitoring, limitations, and program evaluation;
- PPE training and proper fit procedures; and
- PPE donning and doffing procedures.

Additional information on PPE selection based on the hazard evaluation (assessment) and testing is provided in Appendix C of this Manual.

#### **17.2.7 Emergency Response**

Emergencies require prompt action to prevent or reduce the effects of the emergency. Immediate hazards of fire, explosion, and release of toxic vapors or gases are of prime concern. Coordination with installation and community emergency response teams and development of an Emergency Response Plan ensures safe and effective emergency response. Personnel should be alert for indicators of potential hazardous situations. In addition, they should be aware of signs and symptoms in themselves and others that warn of hazardous exposure. Section 12.2 provides guidance on addressing a munitions or explosives emergency.

An Emergency Response or Emergency Action Plan for responding to emergency situations should be developed and included in the site-specific HASP. If contractor personnel will provide on-site emergency response, then an Emergency Response Plan meeting the requirements of 29 CFR Part 1910.120 shall be provided. However, if contractor personnel will evacuate the site and not provide emergency response actions, then an Emergency Action Plan meeting the requirements of 29 CFR Part 1910.38 shall be included in the site-specific HASP. The on-site Emergency Response or Emergency Action Plan shall be compatible and integrated with the disaster, fire, and/or emergency response plans of the installation and, as appropriate, plans of local, state, and federal agencies. The plan will be reviewed regularly as part of the overall training program for site operations. The on-site Emergency Response or Emergency Action Plan will be reviewed periodically and amended to keep it current with site conditions.

#### **17.2.7.1 Emergency Response or Emergency Action Plan**

The Emergency Response Plan or Emergency Action Plan detailing procedures for managing on-site emergencies shall address, at a minimum, the following elements:

- Pre-emergency planning (state/local emergency planning committees);
- Personnel roles, lines of authority, training, and communication procedures;
- Criteria and procedures for emergency situation recognition and methods for prevention;
- Name and telephone numbers of emergency points of contact;
- Emergency alerting and response procedures, emergency responder phone numbers, and criteria for alerting emergency responders;
- Safe distances and places of refuge;
- Site security and control;
- Evacuation routes and procedures, routes to emergency medical treatment facilities;
- Decontamination procedures to include decontaminating injured employees (not covered in other sections of the HASP);
- Emergency medical treatment and first aid;
- PPE and emergency equipment identification and location; and.
- Response critiques and follow-up.

#### **17.3 Site Briefings and Site Access**

As part of an effective health and safety program, safety/pre-entry briefings will be held prior to initiating any site activity and at other times as necessary to ensure that workers, supervisors, inspectors, and emergency response personnel are apprised of the provisions of the site-specific HASP and that it is followed. Prior to entering an area of known or potential contamination, all visitors (private or government) shall meet medical surveillance and training requirements established by the HASP and be briefed by the contractor's Health and Safety Officer (or designee) on standard safety operating procedures. The contractor is responsible for establishing procedures for site access, methods to control access, and enforcement of access control procedures.

#### **17.4 Medical Surveillance**

Medical surveillance requirements for DON employees are found in OPNAVINST 5100.23 (current series). For contractor employees working at HAZWOPER-applicable ER sites, at a minimum, the medical surveillance requirements of 29 CFR Part 1910.120(f), 29 CFR Part 1926.65(f), 29 CFR Part 1910.1030, and Section 28 of USACE EM 385-1-1 Safety and Health Requirements Manual are applicable. Additional hazard-specific medical surveillance requirements may also be applicable based on the hazard encountered and the exposures known or anticipated. All medical examinations and procedures will be performed by or under a certified occupational medical physician and will be provided without costs to the individual, without loss of pay, and at a reasonable time and place. Certification of medical surveillance program participation shall be appended to the HASP. All medical records shall be maintained in accordance with 29 CFR Part 1910.1020. Further direction can be found in the NAVFAC BMS.

All personnel covered by a medical surveillance program will receive medical examinations. In some instances those exams may be specific for the health hazard involved. The examinations will include their medical and work history. It will place special emphasis on symptoms related to the handling of hazardous



substances and other health hazards. The examination will appraise their fitness for duty to include the ability to wear required PPE under conditions that may be expected at the work site. The medical examination will determine an individual's ability to wear a respirator if wearing a respirator is a job requirement.

The examining physician will determine the content of medical examinations or consultations. For HAZWOPER-applicable ER projects, the medical surveillance requirements for information to be provided to the physician, the physician's written opinion, information access by the employee and the government designated authority, recordkeeping requirements, and frequency of medical examinations are contained in 29 CFR Part 1910.120(f), 29 CFR Part 1926.65(f), Section 28 of USACE EM 385-1-1 Safety and Health Requirements Manual, and 29 CFR Part 1910.1020. Those specific requirements should be consulted as part of developing and implementing an effective project medical surveillance program.

#### **17.4.1 Frequency of Medical Examinations and Consultations**

Medical examinations and consultations will be made available for personnel covered by a medical surveillance program on the following schedule:

- Prior to assignment;
- At least once every 12 months for each individual covered (more frequently as deemed necessary by a physician);
- At termination of employment or reassignment to an area where the individual would not be covered by the surveillance program. Examination is not required if the individual had received an examination within the last six months;
- As soon as possible upon notification by an individual who has developed signs or symptoms indicating possible overexposure to hazardous substances or other health hazards;
- As soon as possible when an unprotected individual has been exposed to hazardous substances or other health hazards; and
- At more frequent times if the examining physician determined that an increased frequency of examinations is medically necessary.

## Chapter 18

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### Training

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A cost-effective and successful DON ERP depends on staff exhibiting knowledge and skills over a range of technical, regulatory, and administrative areas. To support this goal, ER personnel are required to receive training in three primary areas:

- Federal and state environmental laws and regulations and DoD policy;
- Making technically sound, cost-effective decisions during implementation of site identification, investigation, cleanup, and closeout; and
- Hazardous waste site training as required by: SARA, 29 CFR Part 1910.120, and OSHA regulations on HAZWOPER (see the NAVFAC BMS).

In addition to the types of training described above, ER personnel also must have strong foundations in the administrative work being done within the DON ERP. Administrative requirements involve contractor interactions and other administrative and financial details associated with the cleanup operation. Although these issues do not pertain to the technical or regulatory aspects of the site, they are of importance to a successful cleanup operation. For example, NAVFAC has designated many of its employees as members of the acquisition workforce under the Defense Acquisition Workforce Improvement Act (DAWIA). The DAWIA coverage helps develop and maintain ER staff expertise through continuous learning and professional development (see DAWIA Operating Guide). It also provides ER staff with the necessary exposure to and understanding of the overall DON acquisition process to enhance interaction with other FECs.

This chapter provides information on the typical scope of training that personnel should receive, and the sources for this training. Additional supporting guidance on training is provided in Chapter 42 of [OPNAV M-5090.1](#), and [MCO P5090.2A](#) (Chapter 5 and Appendix G).

In addition, NAVFAC's [Environmental Community Management Plan](#) provides a framework to ensure the DON's environmental community can meet its present and future mission. The Community Management Plan allows members to enhance their careers and their competencies. Each member of the environmental community should have an individual development plan (IDP) that is directly related to their current competencies, needed competencies, client needs, and career aspirations. NAVFAC also has developed leadership and managerial competencies in addition to the technical competencies. More detail can be found in the NAVFAC BMS.

#### 18.1 Remedial Project Manager Training

The RPM is the primary person responsible for directing assessment and cleanup activities at a DON ERP site and should be capable of performing or overseeing a number of essential tasks. Training is an integral part of developing RPM skills and abilities. Personnel should establish an IDP with their supervisor within the first 12 months of their assignment. Table 18-1 shows a typical progressive training plan for RPMs to follow as they increase their level of expertise.

**Table 18-1 Progressive Training Plan for RPMs**

<b>Courses to be taken during an RPM's first year with NAVFAC</b>	<b>Hours</b>	<b>Offered by</b>
ACQ 101 – Fundamentals of Systems Acquisition Management	40	DAU
Basic Environmental Law	24	CECOS
CLC 222 – Contractors Officer Representative or; CTC 342 – NAVFAC Contracting Officer Representative	32 24	DAU NFACT
HAZWOPER for Uncontrolled Hazardous Waste Site Workers	40	CECOS
Navy Environmental Restoration Program	24	CECOS
NORM Training and Tutorials	8	NAVFAC HQ
<b>Courses to be taken during an RPM's first three years with NAVFAC</b>	<b>Hours</b>	<b>Offered by</b>
CTC 423 – Environmental Contracting	24	NFACT
CTC 415 – Source Selection and Technical Evaluation Board	32	NFACT
CTC 466 – Architect/Engineer Fixed Price Contracting	24	NFACT
Ecological Risk Assessment	24	CECOS
Environmental Background Analysis	16	CECOS
Environmental Geographic Information Systems/Geostatistics	32	CECOS
Environmental Negotiation Workshop	24	CECOS
Environmental Sampling Design and Data Quality Assurance	40	CECOS
FE 201 – Facilities Engineering	24	DAU
FE 301 – Facilities Engineering (GS13 and above)	32	DAU
Health and Environmental Risk Communication	24	CECOS
Human Health Risk Assessment	24	CECOS
Munitions Response Site Management	24	CECOS
NIRIS Training	8	NIRIS Workgroup
Optimizing Remedy Selection and the Site Closeout Process	16	CECOS
Sampling Design & Data Quality Assurance	40	CECOS
Uniform Federal Policy for Quality Assurance Project Plans	16	CECOS
<b>Courses expected for Senior RPMs (3+ years experience)</b>	<b>Hours</b>	<b>Offered by</b>
Advanced Environmental Law	32	CECOS
Advanced Environmental Management	40	CECOS
Advanced Munitions Response Site Management	32	CECOS
Defense-State Memorandum of Agreement Training	16	DSMOA
Environmental Protection	32	CECOS
Environmental Quality Sampling	40	CECOS
Intro to Facilities Engineering & Acquisition/Resident Officer in Charge of Construction (ROICC)	40	CECOS
Intro to Cultural Resource Management Laws and Regulations	24	CECOS
National Environmental Policy Act Application	24	CECOS
Performance Based Contracting for Environmental Contracts	8	NFACT
Water Quality Management	40	CECOS
Capitol Hill Workshop	24	LDP
NEI I - Contemporary Management Theory and Practices	24	LDP
NEI II - Challenge of Executive Leadership	24	LDP
NEI III - Effective Executive Communications	24	LDP

<b>Courses expected for Senior RPMs (3+ years experience) (Cont.)</b>	<b>Hours</b>	<b>Offered by</b>
Professional Registration	N/A	N/A
<b>Annual Training</b>	<b>Hours</b>	<b>Offered by</b>
RITS	16	NAVFAC EXWC
RPM Training	24	NAVFAC HQ
HAZWOPER Refresher	8	CECOS
OER2 Webinars	Varies	NAVFAC EXWC

## 18.2 Training for Non-RPM Personnel

FEAD personnel, ROICCs, Public Works Officers, and CORs are examples of non-RPM personnel involved in the DON ERP who need training based on their roles and responsibilities in the Program. The following subsections provide insight to training requirements for non-RPMs and additional examples of training are provided in Section 42.3.23 of OPNAV M-5090.1, and MCO P5090.2A (Appendix G).

### 18.2.1 Contracting Officer and Task Order Contracting Officer Representatives

The [Environmental Community Management Plan](#) and NAVFAC Instruction 4200.1, [Contracting Officer's Representative](#) specify COR and TO COR training requirements:

- Continuous Learning Center (CLC) 106 COR with a Mission Focus or CLC 222 COR Online Training;
- The basic COR course CTC 342 NAVFAC, COR;
- Ethics training; and
- Combating Trafficking in Persons.

Other training may be required in the performance of assigned duties. CORs are highly encouraged to take CTC 423 Environmental Contracting, and training in the following key systems, if applicable: Contractor Performance Assessment Reporting System (CPARS) and Wide Area Workflow (WAWF). Refresher training is considered essential for maintaining highly effective CORs. COR refresher training is required every three years, consisting of CLC 106 COR with a Mission Focus, annual ethics training, annual CTIP, and an additional six hours of continuous learning training for CORs that monitor other than low risk requirements as determined by the KO.

The TO COR, who provides technical and administrative assistance to the COR, must complete CLC 106 COR with a Mission Focus, CPARS, WAWF, and refresher training every three years.

### 18.2.2 Technical Points of Contact/Subject Matter Experts

Technical points of contact (TPOCs) and SMEs provide assistance to the COR. Assistance may be required to ensure adequate oversight and surveillance of contractor performance, assignment, and use of technical and/or programmatic advisors.

The roles and responsibilities of the TPOC/SME include:

- Reviewing technical/data deliverables in an assigned area;
- Monitoring contractor's schedule and technical compliance in an assigned area;
- Providing performance assessment inputs in an assigned area;
- Providing technical advice in an assigned area; and
- Developing technical clarifications, if required.

The TPOC and SME may require some, if not all, of the COR required training.

### **18.3 Sources of Training**

The Environmental Division at CECOS is the primary source for DON ERP training as well as training in compliance, pollution prevention, and natural and cultural resources. The [CECOS](#) website provides course descriptions and registration information. The site also contains information on how to register for approved courses offered by other services. NAVFAC HQ manages the CECOS ERP training course offerings depending on DON ERP requirements and the FAC/FEC needs, and coordinates course revisions as the program evolves.

Training support for the acquisition workforce (DAWIA, other government, and industry) is provided on the [Defense Acquisition University](#) (DAU) website. DON acquisition workforce members may also obtain training via the DAU. Registration for DAU classes, including Internet-based courses, can be found under the continuous learning tab on the left-hand side of the DAU website.

Other organizations that provide environmental training include:

#### **NAVFAC**

- RITS is a two-day seminar providing the latest information on innovative technologies, methodologies, and guidance. The seminar is geared toward RPMs, but other DoD personnel, federal/state/local regulators, and contractors (with a current, active DON ERP contract) are encouraged to attend. The RITS is offered each year in the spring and is given at several locations across the country to provide more opportunities for RPMs to attend. RITS topics are developed by NAVFAC EXWC in conjunction with the ER Managers and workgroups. Since the topics addressed at the RITS are selected as the "hot technical issues" of the program at the time, RPMs should make it a priority to attend RITS each year. Past RITS presentations are available on the NAVFAC ERB Secure website;
- NAVFAC sponsors RPM Training where DON RPMs come together to exchange ideas and share lessons learned from remediation projects. The presentations provide training for RPMs on real-life cleanup situations, challenges, and implementation. In addition, the training includes several short subject-specific sessions. Major topics include a Washington Perspective session on environmental cleanup policy and emerging issues at active and closed installations, and technical sessions on current remediation topics. The training is hosted by NAVFAC EXWC in Port Hueneme, California. Proceedings from previous trainings can be found on the private side of the NAVFAC ERB website;
- Self-paced web training tools on environmental remediation technologies and related topics. These tools were created to increase RPM's knowledge of, and promote the use of, innovative and efficient remediation technologies. The multimedia tools use animated graphic art, video, audio, and text to provide training on various remediation topics and present case studies from DON sites where innovative technologies have been implemented. These tools can be accessed on the NAVFAC ERB T2 website;
- The OER2 webinar series provides the latest information on DoD and DON ER policy, promotes innovation, shares lessons learned, and includes information on the latest ER tools, technologies, and practices; and
- The TIPS Forum is an internal conference call which is periodically held by NAVFAC HQ with all FACs/FECs and other DON entities, with support provided by NAVFAC EXWC. The purpose of the

TIPS Forum is to discuss challenging issues facing RPMs on DON ERP sites and potential solutions to address those issues.

The RITS, NAVFAC ER Training, OER2 Webinar Series, and TIPS are eligible for continuous learning credits in DAWIA and may also fulfill professional licensing continuous learning requirements.

#### **DoD**

- Environmental training courses for DoD are advertised on [DENIX](#). This page also provides information on upcoming conferences and workshops.

#### **EPA**

- Provides training on topics such as regulations, risk assessment, and innovative technologies. EPA's schedule for workshops, conferences, and meetings relating to its Superfund program is provided at the [EPA CLU-In](#) website or the [EPA Training Exchange](#); and
- EPA National Enforcement Training Institute ([NETI](#)) provides training to environmental enforcement personnel including government inspectors, the legal community, and investigators in federal, state, tribal, and local governments. NETI's training services include self-paced training modules, webinars, and live training courses from national experts across a broad range of enforcement related topics.

#### **USGS**

- The USGS provides training on surface water, groundwater, natural resources management, and wetlands. The [USGS](#) website provides course offering information.

#### **ITRC**

- The ITRC is a state-led coalition working together with EPA, DoD, industry, and stakeholders to achieve regulatory acceptance of environmental technologies. It develops guidance documents and provides training courses to meet the needs of both regulators and environmental consultants. The [ITRC](#) website provides information on available conferences and workshops.

#### **SERDP/ESTCP**

- SERDP/ESTCP identifies, develops, and transitions environmental technologies that relate directly to defense mission accomplishment. The [SERDP/ESTCP](#) website provides information on upcoming symposiums, workshops, and webinars.

RPMs can also find training opportunities through RDT&E programs and DON ERP workgroups.

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## Chapter 19

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### Innovative Technology Development and Transfer

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Technologies generally fall within one of three general categories: emerging, innovative, or established. Emerging technologies require full or partial RDT&E to meet user requirements. Innovative technologies are commercially available and have been tested and evaluated but may require some testing and evaluation to meet specific user requirements. In most cases, specifications and detailed criteria will be needed before innovative technologies can be transferred to the field. Established technologies are commercially available and require little or no modification for the user and may include technologies that were once considered innovative such as soil vapor extraction or air sparging.

DoD has established robust RDT&E programs that play a large role in the DON ERP. Innovative technologies allow DON ERP to clean up sites in a faster, more cost-effective and/or more sustainable manner, while being protective of human health and the environment. DON ERP has established mechanisms and workgroups to transfer technology to end users (i.e., RPMs, stakeholders, and contractors). This chapter is devoted to a discussion of those programs. Other state and federal technology programs are also of great value to the DON RDT&E Program; these programs often allow for simplified implementation of ER technologies at DON sites.

#### **19.1 Environmental Restoration Research, Development, Testing and Evaluation Programs**

The goals of DoD and DON RDT&E programs are to develop innovative technologies that address high-priority ER needs, while reducing total ownership costs, enhancing mission capabilities, and fulfilling DoD environmental stewardship responsibilities. DON is very active in RDT&E projects within DoD programs. The DON often leads DoD RDT&E-sponsored projects that address specific needs within the DON ERP.

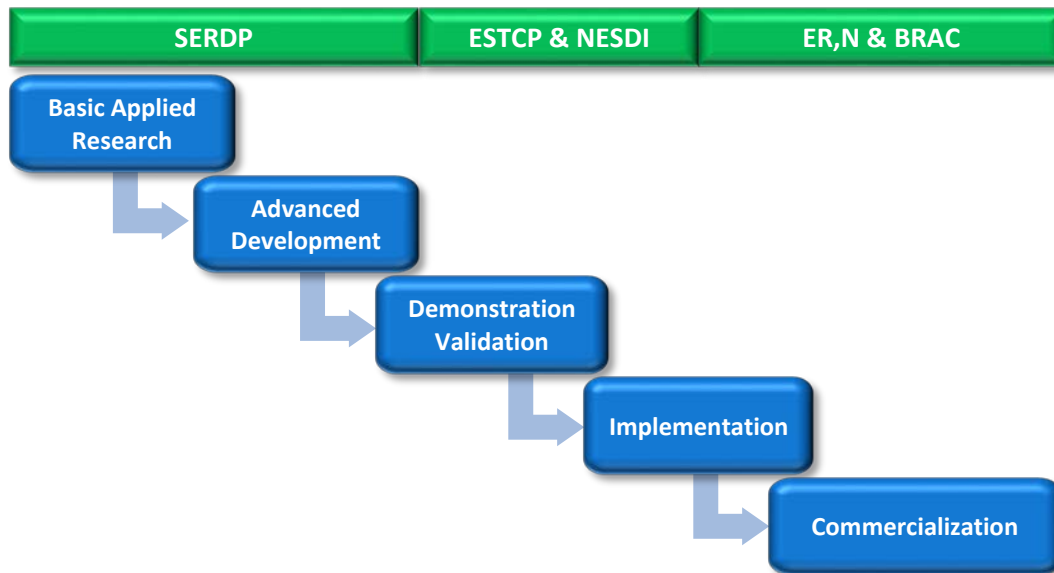
Two DoD programs are designed to address the common needs of the military services: SERDP for science and technology, which relates directly to the basic research, applied research, and advanced development steps of RDT&E; and ESTCP for technology demonstration and validation, which relates to the demonstration/validation step of RDT&E. They are independent programs managed from a Joint Office to coordinate the full spectrum of efforts, from basic and applied research to field demonstration and validation.

The NESDI Program is the DON's program committed to investing in innovative and cost-effective technologies to support fleet readiness.

Outside of the traditional RDT&E channels, there are also opportunities to collaborate or partner with technology development programs being conducted to support the warfighter. An example of this approach is the use of ONR-sponsored, Naval Surface Warfare Center Panama City-developed, autonomous underwater vehicle assets originally developed for mine hunting that are also capable of searching for MEC. Another example is the possible application of SPAWAR Radiation, Detection, Indication, and Computation (RADIAC) knowledge and assets to address radiological sites. Both of these technology areas address capabilities and problems that are unique to military needs and generally not found in the private sector.

Figure 19-1 identifies the progression of a new environmental technology and indicates how DoD and DON Programs fit into the development and implementation of new environmental technologies. Each of these programs is described in more detail in the following subsections.





**Figure 19-1 DoD/DON ERP Research and Development Structure**

### 19.1.1 Strategic Environmental Research and Development Program

[SERDP](#) is DoD’s environmental science and technology R&D program, which is planned and executed in partnership with the DOE and EPA, with participation by numerous other federal and non-federal organizations. SERDP invests across a broad spectrum of basic and applied research. Within their broad areas of interest, SERDP and ESTCP focus on five program areas: Energy and Water, ER, MR, Resource Conservation and Climate Change, and Weapons Systems and Platforms. The goal of the programs is to focus on cross-service requirements and pursue solutions to DoD environmental challenges. The development and application of innovative environmental technologies will reduce the costs, risks, and time required to resolve environmental problems while, at the same time, enhancing and sustaining military readiness.

The SERDP ER area focuses on cleaning and managing contaminated lands on current and former military installations. It supports the development of innovative technologies to characterize, remediate, and scientifically manage contaminants in soil, sediments, groundwater, surface water and wastewater.

SERDP and ESTCP ER areas of investment currently include:

- Managing contaminated sediments;
- Remediating and monitoring contaminated groundwater; and
- Developing tools for improved risk assessment.

The SERDP MR area supports the development of innovative technologies that can characterize, remediate, and scientifically manage sites affected by military munitions. DoD is responsible for thousands of properties across the nation and around the world, including current and former testing and training ranges both on land and in underwater environments.

SERDP and ESTCP MR areas of investment currently focus on:

- **Land:** As a result of past military training and weapons testing activities, military munitions exist on sites designated for BRAC, on FUDS, and other closed ranges on active installations. The sizes

of these sites range from a few acres to tens of thousands of acres. These sites occur in open deserts, farmland, forests and mountain ranges. Geology and vegetation can be simple and benign or complex and difficult. Munitions ranging in size from 20-mm projectiles to 2,000-pound bombs can be distributed on the surface or buried at these sites showing no visible evidence of their presence.

The MR area is developing and demonstrating advanced sensors, signal processing methodologies, platforms, supporting technologies, and remediation technologies to address the diverse challenges associated with the cleanup of munitions-contaminated land sites.

- **Underwater Environments:** Many active and former military installations have ranges and training areas that include adjacent water environments such as ponds, lakes, rivers, estuaries, and coastal ocean areas. On other sites, training and testing areas were deliberately situated in water environments. Disposal and accidents have generated munitions contamination in the coastal and inland waters throughout the United States. The underwater environment both restricts access and may significantly impact the performance of characterization technologies.

The MR area supports the development of technologies that can detect, characterize, and remediate military munitions in underwater sites.

Every year, SERDP funds environmental R&D projects through a competitive process. Researchers from federal organizations, universities, and private industry can apply for SERDP funding. SERDP issues two annual solicitations. The core solicitation seeks proposals for basic and applied research, and advanced technology development. Core projects vary in cost and duration, consistent with the scope of the work proposed. The SERDP Exploratory Development (SEED) program is designed to investigate innovative approaches that entail high technical risk or require supporting data to provide proof of concept. SEED projects are limited to not more than \$150,000 and are approximately one year in duration. SEED projects that are successful are considered for additional follow-on funding. All submissions must be in response to a Statement of Need associated with the solicitation. Core and SEED solicitations have different SONs and different due dates.

### 19.1.2 Environmental Security Technology Certification Program

[ESTCP](#) is the DoD environmental technology demonstration and validation program. The Program was established in 1995 to promote the transfer of innovative technologies that have successfully established proof of concept for field or production use. ESTCP demonstrations collect cost and performance data to help overcome the barriers to employ an innovative technology because of concerns regarding technical or programmatic risk.

The Program's goal is to identify and demonstrate the most promising innovative and cost-effective technologies and methods that address DoD's high-priority environmental requirements. Projects conduct formal demonstrations at DoD sites in operational settings to document and validate improved performance and cost savings. To ensure the demonstrated technologies have a real impact, ESTCP collaborates with end users and regulators throughout the development and execution of each demonstration. Transition challenges are overcome with rigorous and well-documented demonstrations that provide the information needed by all stakeholders for acceptance of the technology.

ESTCP issues an annual solicitation for proposals from the federal government, academia, and industry and employs a competitive selection process to ensure that ESTCP funds high-quality demonstrations. ESTCP requires each project to develop a formal test and evaluation plan. Demonstration results are subject to rigorous technical reviews to ensure that the conclusions are accurate and well supported by data.

DON is actively involved in ESTCP projects as principal investigators, project partners, or members of program area review committees. In addition, RPMs are encouraged to identify and submit potential DON ERP sites for upcoming ESTCP projects. Candidate sites may include sites which are available for demonstration fieldwork and can benefit from improved methods or technologies. If the technology requirements at a DON site match project work in the R&D community, the site may be selected for demonstration/validation work that will be funded and accomplished by ESTCP. Application of the latest principles and technologies from the R&D community could help the RPM in the FS and technology selection process, or provide potential solutions to a technical challenge.

### **19.1.3 Navy Environmental Sustainability Development to Integration Program**

The [NESDI](#) Program is committed to investing in innovative and cost-effective technologies to support fleet readiness. The NESDI Program is sponsored by CNO N45 and managed by NAVFAC. The Technology Development Workgroup (TDWG) is responsible for the direction of the program and is chaired by NAVFAC. It also includes representatives from Naval Air Systems Command (NAVAIR), NAVSEA, and SPAWAR.

NESDI Program investments focus primarily on innovative and cost-effective approaches for environmental compliance requirements and pollution prevention opportunities related to range sustainment, weapon system maintenance, air and port operations, and installation operations. The NESDI Program also invests in areas related to cleanup that involve DON-unique areas, such as sediments, range sustainability, and those areas where the DON can realize significant cost reductions.

Projects are initiated annually through a competitive process that begins with needs identification and validation. Anyone can submit environmental needs or requirements for program review and investment consideration via the public homepage on the NESDI website. Once the needs are submitted, they are assessed, validated, and prioritized by experts in Field Working Groups (which includes the NAVFAC Workgroups discussed in Chapter 2) and the TDWG. Pre-proposals should address one or more prioritized need(s). Following acceptance of a pre-proposal by the TDWG, the principal investigator is invited to develop and submit a full technical proposal.

The NESDI Program serves a broad range of end users and implementation sites. The list of project performers include the NAVAIR [Naval Aviation Depots, Naval Air Warfare Center Aircraft Division], NAVFAC EXWC, NAVSEA (Naval Surface Warfare Centers, Naval Undersea Warfare Centers), and SPAWAR. The NESDI website provides project fact sheets for on-going and completed projects. The NESDI program publishes a quarterly newsletter, NESDI News, and Highlights & Happenings that can be downloaded from its website.

## **19.2 DON Approach to Innovative Technology Implementation**

DON integrates RDT&E into its framework for the DON ERP to develop improved investigation and cleanup technologies and make them available to RPMs. These technologies are often considered innovative, and can improve the speed and quality of the investigations and cleanups at ER sites and at the same time expedite cost-effective SCs in a sustainable manner.

To overcome real or perceived barriers to using innovative environmental remediation technologies, NAVFAC has developed a strategic plan for T2. It is implemented through the NAVFAC T2 Program managed by NAVFAC EXWC. A critical aspect to this strategic plan and the successful implementation of innovative technologies is the technical input and feedback from the end user. This is accomplished largely through interface with the NAVFAC workgroups.

The NAVFAC T2 Program is geared toward the RPM. Additionally, contractors, regulators, other federal agency personnel, and public stakeholders may benefit from the publicly available information. T2 mechanisms include:

- Distribution of information through NAVFAC workgroups;
- T2 products and information sources on the Internet;
- Innovative technology seminars and training;
- Cost and performance reports;
- Handbooks; and
- Innovative contracting mechanisms to assist technology implementation.

To make maximum use of scientific and engineering talent, DON draws upon expertise from several organizations. Often, innovative technologies have been developed in partnership with industry and academia. Overcoming technical and regulatory barriers to the use of innovative technologies can also be accomplished through association with these organizations. Some of the organizations NAVFAC interfaces with are described in Section 19.4.

### **19.3 NAVFAC Technology Transfer Program**

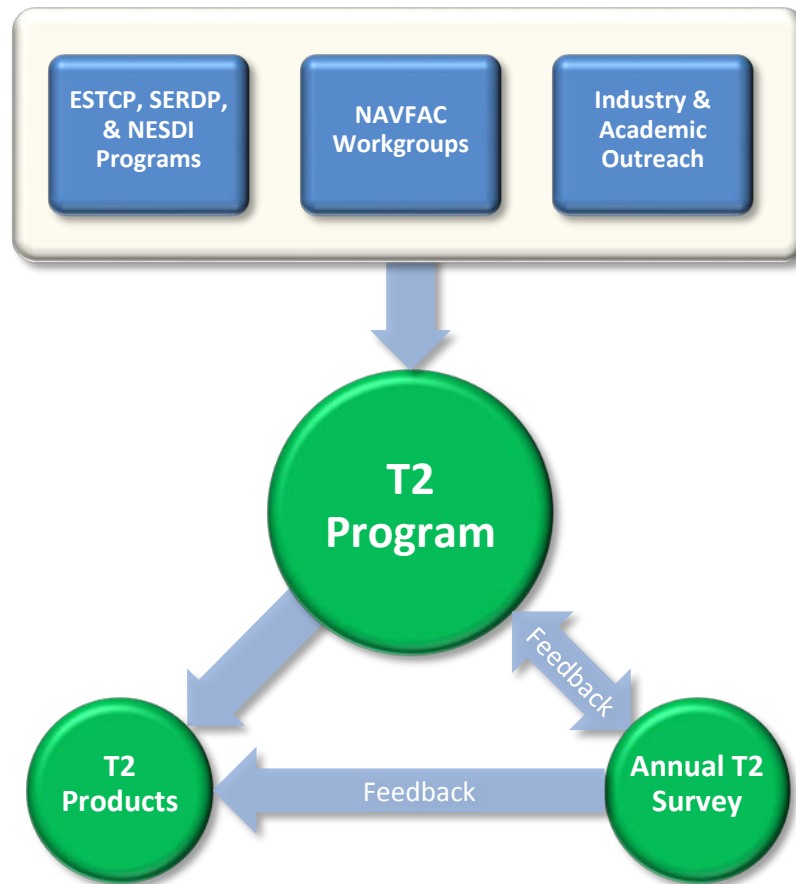
NAVFAC's strategy for using the most promising innovative technologies to achieve RC and SC begins with the NAVFAC T2 Program. The NAVFAC T2 Program supports information sharing among RPMs and the NAVFAC ER community to identify the DON's ER challenges and to promote the use of innovative and cost-effective solutions. The goal of the NAVFAC T2 Program is to exchange information about the latest research, technology innovations, and lessons learned from real-world applications.

The transfer of information about a new technology or improved methodology is predominately a process of communication. The NAVFAC T2 Program supports efforts to increase the awareness and use of innovative technologies, reduce environmental cleanup costs, and improve technology performance for the DON ERP.

The NAVFAC T2 Program issues a broad range of products that promote communication and information exchange among the NAVFAC ER community. The communication mechanisms of the NAVFAC T2 Program can take many forms including the printed word, multi-media, formal instruction, personal interaction, and social media.

Figure 19-2 identifies the partnering efforts and inputs that are integral to the NAVFAC T2 Program. The NAVFAC T2 Program gathers information from personnel within NAVFAC workgroups and uses surveys and existing databases to gain insight into overall DON ERP trends and needs.

The Annual T2 Survey focuses NAVFAC's T2 initiatives on the most important and most prevalent technology challenges facing RPMs. The T2 Survey is traditionally released in both hard copy format at the RITS and online. Responses are received from a variety of audiences including RPMs, contractors, and state or federal regulators working with RPMs. Future T2 products are tailored to RPM needs based on the results of the T2 survey.



**Figure 19-2 The T2 Program**

### **19.3.1 NAVFAC ERB Website**

The [NAVFAC ERB website](#) is DON's "one-stop shopping" site for all ER information and links to other agency websites. In addition, users can easily bookmark or print any of the available pages. The information found on the website and on the related linked pages provides details on specific investigation, monitoring, and remediation technologies and methodologies and additional useful information. DON guidance documents, reports on innovative environmental technologies, and interactive training tools are also easily accessible.

Appendix D describes some of the items available and provides links to download them. The website has pages on many topics including:

- Acronyms/Glossary;
- Guidance, Policy and Regulations;
- ER Publications A through Z;
- Chlorinated Solvents;
- Emerging Issues;
- ER Safety;
- Five-Year Reviews;

- GSR;
- Laboratory QA;
- LTM;
- MRS;
- NIRIS;
- Optimization;
- Risk Assessment;
- Sediments;
- Technologies;
- VI;
- CECOS Training;
- RITS; and
- NAVFAC ER Workgroups.

T2 Products available on NAVFAC ERB include:

- T2 e-mail updates;
- Videos;
- Fact sheets;
- Success stories;
- Checklists;
- Handbooks;
- White papers;
- Cost & performance reports; and
- Webinars.

### **19.3.2 Web-Based Technology Transfer Tools**

Web-based [T2 Tools](#) are developed under the NAVFAC T2 Program to educate professionals on select new ER technologies and strategies. These web-based applications use multi-media such as video, audio, animations, and web links. They include training tools, decision support tools, and case studies. The topics covered include key issues identified as important challenges faced by RPMs such as contaminated sediment sites; VI characterization and mitigation issues; source zone technologies and strategies for LNAPL and DNAPL; advanced site characterization methods; passive and in situ remedial technologies; optimizing LTMgt; GSR; and MRP.

### **19.3.3 Documents and Reports**

NAVFAC guidance documents are generally developed by the NAVFAC workgroups. Technical reports and cost and performance reports are often generated by project teams to document the results of a SERDP, ESTCP, NESDI, or other R&D project and are posted on the respective websites and uploaded to the [Federal Remediation Technologies Roundtable](#) website.

## 19.4 Partnerships with State and Federal Innovative Technology Programs

DON has established partnerships with state and federal agencies to facilitate the development and improvement of environmental technologies to address mutual cleanup problems and enhance regulatory acceptance of innovative environmental technologies.

### 19.4.1 Federal Remediation Technologies Roundtable

The Federal Remediation Technologies Roundtable ([FRTR](#)) works to build a collaborative atmosphere among federal agencies involved in hazardous waste site cleanup. FRTR was established in 1990 to bring together top federal cleanup program managers and other remediation community representatives to:

- Share information and learn about technology-related efforts of mutual interest;
- Discuss future directions of the national site remediation programs and their impact on the technology market;
- Interact with similar state and private industry technology development programs; and
- Form partnerships to pursue subjects of mutual interest.

FRTR member-agencies include DoD, EPA, DOE, Department of the Interior, and National Aeronautics and Space Administration.

Since its inception, collaborative efforts among the FRTR member agencies have led to technology development and demonstration partnerships with private developers, a more consistent and unified federal approach to technology evaluation and regulatory acceptance, and a variety of T2 tools and other information resources.

FRTR member-agencies meet semi-annually. These meetings offer a unique opportunity for federal cleanup program managers and other remediation community representatives to identify and discuss priority cleanup issues; share lessons learned; and form collaborative working groups to pursue subjects of mutual interest.

The FRTR has developed important tools to assist users in evaluating and selecting time- and cost-effective innovative technologies to characterize and clean up their hazardous waste sites, including:

- **The [Remediation Technologies Screening Matrix](#)** – A user-friendly tool for screening potentially applicable technologies for a remediation project. The matrix allows the user to screen in situ and ex situ technologies for either soil or groundwater remediation. Variables used in screening include contaminants, development status, overall cost, and cleanup time. In-depth information on each technology is also available, including direct links to the database of cost and performance reports written by FRTR members; and
- **The [Field Sampling and Analysis Technologies Matrix](#)** – The Field Sampling and Analysis Technologies Matrix and Reference Guide are intended to be an initial reference source that will help users to understand innovative and conventional site characterization technologies and techniques. This document is intended to enhance technology transfer and provide much needed comparison between competing technologies. The effort is intended to directly benefit DON (ER,N and BRAC); however, both the Matrix and Reference Guide can be used by program managers working anywhere within the public or private sector. RPMs must often sort through large volumes of related and overlapping information to evaluate alternative technologies. To assist the RPM in this process and to enhance technology transfer among federal agencies, this document was developed to combine the unique features of several agency publications into a single document. It allows the RPM to pursue questions based on contamination problems as

well as specific technology issues. As conventional methods improve and new technologies emerge, periodic updates of this document will be issued to help the RPM keep pace with the ever-changing range of technology options available.

Member-agencies of the FRTR are working jointly to make data more widely available on real experiences and lessons learned in selecting and implementing treatment and site characterization technologies to clean up soil and groundwater contamination at ER sites. The remediation case study reports describe the performance and cost of technology applications at full-scale and large-scale demonstration projects. Some of the information available includes:

- [FRTR Remediation Case Study Searchable Database](#);
- [Remediation Technology Assessment Reports](#);
- [Site Characterization and Monitoring Case Studies](#);
- [General Information on Case Studies](#);
- [Technology Cost Analysis Links](#);
- [Remediation System Optimization Case Studies](#); and
- [Abstracts of Remediation Case Studies](#).

#### **19.4.2 EPA Technology Innovation and Field Services Division**

The mission of the [EPA Technology Innovation and Field Services Division](#) is to advocate more effective, less costly approaches (i.e., “smarter solutions”) by government and industry to assess and clean up contaminated waste sites, soil, and groundwater. Working with other federal agencies, states, consulting engineering firms, responsible parties, technology developers, and the investment community, EPA provides robust technology and market information and works to remove policy and institutional impediments related to the deployment of these technologies. The scope of the mission extends to Superfund sites, CA sites, UST cleanups, state voluntary cleanup programs, and Brownfields. Technologies of interest are for field sampling and analysis and management (treatment and containment) of contaminated soil and groundwater.

#### **19.4.3 Interstate Technology and Regulatory Council**

[ITRC](#) is a state-led coalition working together with federal agencies, industry, state regulators, and other stakeholders to achieve regulatory acceptance of environmental technologies and to develop technical and regulatory guidance documents and training courses. These parties cooperate to break down barriers and reduce cleanup and compliance costs, making it easier to use new technologies, and helping states maximize resources. ITRC works with state representatives to ensure that ITRC products and services have maximum impact among state environmental agencies and technology users.

DON works with the other DoD services and federal partners to support ITRC by providing funding and technical experts to participate in many of the technology and topic-specific ITRC teams. In addition to participating on ITRC teams, each DoD service has a liaison to the ITRC Board of Advisors. DON representatives ensure that the ITRC technical teams are aware of DON and DoD issues, concerns, and policies, as well as the latest DoD R&D results. DON project managers provide numerous case study examples to include in ITRC documents. This ensures that the ITRC documents can be most effectively developed and used by DoD as well as other interested parties.

Once DoD has concurred with the ITRC documents, NAVFAC uses its many internal workgroups to distribute and promote the ITRC products and maximize their benefits to the cleanup efforts. Table 19-1 provides examples of ITRC technical teams and products.



**Table 19-1 Examples of ITRC Team Products**

Attenuation Processes for Metals and Radionuclides Team
<a href="#"><i><u>A Decision Framework for Applying Monitored Natural Attenuation Processes to Metals and Radionuclides in Groundwater</u></i></a>
Bioremediation of DNAPLs Team
<a href="#"><i><u>In Situ Bioremediation of Chlorinated Ethene: DNAPL Source Zones</u></i></a>
Contaminated Sediments Team
<a href="#"><i><u>Incorporating Bioavailability Considerations into the Evaluation of Contaminated Sediment Sites</u></i></a>
<a href="#"><i><u>Contaminated Sediments Remediation – Remedy Selection for Contaminated Sediments</u></i></a>
Diffusion Samplers Team
<a href="#"><i><u>Protocol for Use of Five Passive Samplers to Sample for a Variety of Contaminants in Groundwater</u></i></a>
Environmental Molecular Diagnostics Team
<a href="#"><i><u>New Tools for Better Decisions</u></i></a>
<a href="#"><i><u>Environmental Molecular Diagnostics Fact Sheets</u></i></a>
Geophysical Classification for Munitions Response Team
<a href="#"><i><u>Geophysical Classification for Munitions Response</u></i></a>
Green and Sustainable Remediation Team
<a href="#"><i><u>Green and Sustainable Remediation: A Practical Framework</u></i></a>
<a href="#"><i><u>Green and Sustainable Remediation: State of the Science and Practice</u></i></a>
Groundwater Statistics and Monitoring Compliance Team
<a href="#"><i><u>Groundwater Statistics and Monitoring Compliance (GSMC) Web-based Guidance Document</u></i></a>
Incremental Sampling Team
<a href="#"><i><u>Incremental Sampling Methodology</u></i></a>
Integrated DNAPL Site Strategy Team
<a href="#"><i><u>Integrated DNAPL Site Strategy</u></i></a>
LNAPL Team
<a href="#"><i><u>Evaluating LNAPL Remedial Technologies for Achieving Project Goals</u></i></a>
<a href="#"><i><u>Evaluating Natural Source Zone Depletion at Sites with LNAPL</u></i></a>
Permeable Reactive Barriers Team
<a href="#"><i><u>Permeable Reactive Barrier: Technology Update</u></i></a>
Petroleum Vapor Intrusion Team
<a href="#"><i><u>Petroleum Vapor Intrusion Guidance</u></i></a>
Phytotechnology Team
<a href="#"><i><u>Phytotechnology Technical and Regulatory Guidance and Decision Trees, Revised</u></i></a>
Remediation Risk Management Team
<a href="#"><i><u>Using Remediation Risk Management to Address Groundwater Cleanup Challenges at Complex Sites</u></i></a>
<a href="#"><i><u>Project Risk Management for Site Remediation</u></i></a>

**Table 19-1 Examples of ITRC Team Products (Continued)**

Unexploded Ordnance Team
<a href="#"><i>Frequently Asked Questions about Wide-Area Assessment for Munitions Response Projects</i></a>
<a href="#"><i>Quality Considerations for Munitions Response Projects</i></a>
Vapor Intrusion Team
<a href="#"><i>Vapor Intrusion Pathway: A Practical Guideline</i></a>

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## Appendix A – References

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Department of the Navy (DON) Environmental Restoration Program (ERP) policy and guidance documents referenced in this Manual are listed in Table A-1 with hyperlinks. A few of the overarching documents are highlighted here for quick reference. Table A-2 provides hyperlinks to key websites.

[Defense Environmental Restoration Program \(DERP\) Management Manual](#) Department of Defense Manual (DoDM) 4715.20, also known as the DERP Manual, is a companion to DoD Directive (DoDD) 4715.1E, Environment, Safety, and Occupational Health (ESOH) and DoD Instruction (DoDI) 4715.07, DERP. It provides additional and new guidance on implementation of the DERP, consistent with DoDDs and DoDIs.

[Environmental Readiness Program Manual](#) Office of the Chief of Naval Operations (OPNAV) M-5090.1 10 is the primary DON policies and procedures guide for managing environmental and natural resource programs. The manual is consistent with all applicable statutes, Executive Orders (EOs), DoDDs, DoDIs, and DON instructions. ERP guidelines are found in Chapter 42.

[Marine Corps Environmental Compliance and Protection Manual](#) Marine Corps Order (MCO) P5090.2A establishes policy, discusses requirements, and assigns responsibilities for the management of the environment and natural resources for Marine Corps activities. It also contains ERP guidance, and describes both command responsibilities for environmental management and updated funding procedures.

[Naval Sea Systems Command \(NAVSEA\) OP 5, Ammunition and Explosives Safety Ashore, Seventh Edition](#) presents Navy and Marine Corps personnel with the characteristics and hazards of ammunition, explosives, and other related hazardous materials, and specifies standardized safety regulations for all operations where ammunition and explosives are or are intended to be present. The manual provides explosives safety information and regulations regarding conventional ammunition, ammunition components, explosives, and related hazardous material operations at all DON activities. It identifies Naval Ordnance Safety and Security Activity's (NOSSA's) responsibility for general supervision over explosives safety throughout DON. In particular, Section 2-1.14 of the manual discusses decontamination and disposal of contaminated facilities, land, tools, material, equipment, and ordnance. OP 5 is not available online; copies can be requested by contacting NOSSA or NAVSEA.

[NOSSA Instruction 8020.15 \(series\)](#) assigns responsibility and establishes procedures and reporting requirements for oversight, review, and verification of the explosives safety aspects of the DON Munitions Response Program (MRP). This includes review and approval of each site's Explosive Safety Submission (ESS) before the start of munitions response (MR) activities, oversight of MR activities during operations, review of the After Action Report (AAR) following response activities, and final verification of all response actions taken. See Section 12.3.1.1 of this Manual for additional information on ESS, and Section 12.3.9 for additional information on AAR.

[OPNAVINST 8020.15A/MCO 8020.13A](#) defines the authority and responsibility for the oversight, review, and verification of the explosives safety aspects of response actions involving munitions and explosives of concern (MEC). The policy requires all response actions involving real property known or suspected to contain MEC to have approved plans and appropriate documentation. Chief of Naval Operations (CNO) has designated NOSSA and Marine Corps Systems Command (MARCORSYSCOM) to provide explosives safety oversight for the implementation of response actions involving military munitions and, upon completion of these response actions, to verify that appropriate explosives safety actions have been

properly completed consistent with the reasonably anticipated reuse of the property. To the extent practical and in accordance with OPNAV M-5090.1, other human health and environmental responses will be integrated with those addressing explosives safety.

**Table A-1 Environmental Restoration References**

Subject	DON ERP Manual Chapter #	Document Name	Type	Issued by	Reference	Web Address
ARARs	8	Clarification of the Role of Applicable, or Relevant and Appropriate Requirements in Establishing Preliminary Remediation Goals Under CERCLA	Policy	EPA	EPA 540/F-97/008 OSWER 9200.4-23, NTIS: PB97-963246INX Aug 1997	<a href="http://nepis.epa.gov/Exe/ZyNET.exe/9101KCYR.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1995+Thru+1999&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5Cindex%20Data%5C95thru99%5Ctxt%5C00000034%5C9101KCYR.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyDegree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425&amp;Display=p%7Cf&amp;DefSeekPage=x&amp;SearchBack=ZyActionL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;MaximumPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURL">http://nepis.epa.gov/Exe/ZyNET.exe/9101KCYR.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1995+Thru+1999&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5Cindex%20Data%5C95thru99%5Ctxt%5C00000034%5C9101KCYR.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyDegree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425&amp;Display=p%7Cf&amp;DefSeekPage=x&amp;SearchBack=ZyActionL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;MaximumPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURL</a>
	8	Compendium of Federal Facilities Cleanup Management Information	Compendium	EPA	EPA 540/R-98/004 Feb 1998	<a href="http://www.epa.gov/sites/production/files/2015-09/documents/compend.pdf">http://www.epa.gov/sites/production/files/2015-09/documents/compend.pdf</a>
	8	Guidance for Evaluating the Technical Impracticability of Groundwater Restoration	Guidance	EPA	EPA 540-R-93-080 OSWER 9234.2-25, NTIS: PB93-963507 Sep 1993	<a href="https://clu-in.org/download/contaminantfocus/dnapi/Policy_and_Guidance/TI_guidance.pdf">https://clu-in.org/download/contaminantfocus/dnapi/Policy_and_Guidance/TI_guidance.pdf</a>
Asbestos	13	Asbestos Guidance/Frequently Asked Questions	FAQs	NAVFAC	5090 Ser 12008/EV3-KB 17 May 2012	<a href="http://www.navfac.navy.mil/content/dam/navfac/SpecaltyCenters/EngineeringandExpeditionaryWarfareCenter/Environmental/Restoration/er_pdfs/gpr/navfac-ev-guid-asbestos-20120517.pdf">http://www.navfac.navy.mil/content/dam/navfac/SpecaltyCenters/EngineeringandExpeditionaryWarfareCenter/Environmental/Restoration/er_pdfs/gpr/navfac-ev-guid-asbestos-20120517.pdf</a>
Background	8	Guidance for Environmental Background Analysis Volume I: Soil	Guidance	NAVFAC	UG-2049-ENV, Apr 2002	<a href="http://www.navfac.navy.mil/content/dam/navfac/SpecaltyCenters/EngineeringandExpeditionaryWarfareCenter/Environmental/Restoration/er_pdfs/gpr/navfac-esc-ev-ug-2049-env-bkgrd-soil-200204.pdf">http://www.navfac.navy.mil/content/dam/navfac/SpecaltyCenters/EngineeringandExpeditionaryWarfareCenter/Environmental/Restoration/er_pdfs/gpr/navfac-esc-ev-ug-2049-env-bkgrd-soil-200204.pdf</a>
	8	Guidance for Environmental Background Analysis Volume II: Sediment	Guidance	NAVFAC	UG-2054-ENV, Apr 2003	<a href="http://www.navfac.navy.mil/content/dam/navfac/SpecaltyCenters/EngineeringandExpeditionaryWarfareCenter/Environmental/Restoration/er_pdfs/gpr/navfac-esc-ev-ug-2054-env-bkgrd-seds-200304.pdf">http://www.navfac.navy.mil/content/dam/navfac/SpecaltyCenters/EngineeringandExpeditionaryWarfareCenter/Environmental/Restoration/er_pdfs/gpr/navfac-esc-ev-ug-2054-env-bkgrd-seds-200304.pdf</a>
	8	Guidance for Environmental Background Analysis Volume III: Groundwater	Guidance	NAVFAC	UG-2059-ENV, Apr 2004	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/navfac-esc-ev-ug-2059-env-bkgrd-gw-200404.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/navfac-esc-ev-ug-2059-env-bkgrd-gw-200404.pdf</a>

**Table A-1 Environmental Restoration References (Continued)**

Subject	DON ERP Manual Chapter #	Document Name	Type	Issued by	Reference	Web Address
Background (continued)	8, 13	Guidance for Environmental Background Analysis Volume IV: Vapor Intrusion Pathway	Guidance	NAVFAC	UG-2091-ENV, Sep 2010	<a href="http://www.navfac.navy.mil/content/dam/navfac/SpecaltyCenters/EngineeringandExpeditionaryWarfareCenter/Environmental/Restoration/er_pdfs/gpr/navfac-ev-ug-2091-env-bkgrd-vi-201104if.pdf">http://www.navfac.navy.mil/content/dam/navfac/SpecaltyCenters/EngineeringandExpeditionaryWarfareCenter/Environmental/Restoration/er_pdfs/gpr/navfac-ev-ug-2091-env-bkgrd-vi-201104if.pdf</a>
	8	Policy on the Use of Background Chemical Levels	Policy	DON	30 Jan 2004	<a href="http://www.navfac.navy.mil/content/dam/navfac/SpecaltyCenters/EngineeringandExpeditionaryWarfareCenter/Environmental/Restoration/er_pdfs/gpr/navy-ev-pol-bkgrd-20040130.pdf">http://www.navfac.navy.mil/content/dam/navfac/SpecaltyCenters/EngineeringandExpeditionaryWarfareCenter/Environmental/Restoration/er_pdfs/gpr/navy-ev-pol-bkgrd-20040130.pdf</a>
BRAC	7	Assignment of Responsibilities to the BRAC PMO and Delegation of Authority Memorandum	Policy	DON	15 Nov 2004	<a href="http://www.navfac.navy.mil/content/dam/navfac/SpecaltyCenters/EngineeringandExpeditionaryWarfareCenter/Environmental/Restoration/er_pdfs/gpr/navfac-ev-ltr-bracpmo-20041129.pdf">http://www.navfac.navy.mil/content/dam/navfac/SpecaltyCenters/EngineeringandExpeditionaryWarfareCenter/Environmental/Restoration/er_pdfs/gpr/navfac-ev-ltr-bracpmo-20041129.pdf</a>
	14	Base Redevelopment and Realignment Manual	Manual	DoD	DoD 4165.66-M 1 Mar 2006	<a href="http://www.acq.osd.mil/brac/Downloads/Index%20Page/4165-66-M-BRRM-508.pdf">http://www.acq.osd.mil/brac/Downloads/Index%20Page/4165-66-M-BRRM-508.pdf</a>
	14	Early Transfer Authority, A Guide to Using ETA to Dispose of Surplus Property	Guidance	DoD	1 Oct 2004	<a href="http://www.oea.gov/sites/default/files/resources/early-transfer-authority-a-guide-to-using-eta-to-dispose-of-surplus-property.pdf">http://www.oea.gov/sites/default/files/resources/early-transfer-authority-a-guide-to-using-eta-to-dispose-of-surplus-property.pdf</a>
CERCLA	1, 15	Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980	Law	US CONGRESS	42 USC CHAPTER 103	<a href="http://www.gpo.gov/fdsys/pkg/USCODE-2010-title42/pdf/USCODE-2010-title42-chap103.pdf">http://www.gpo.gov/fdsys/pkg/USCODE-2010-title42/pdf/USCODE-2010-title42-chap103.pdf</a>
	8	CERCLA Compliance with Other Laws Manual: Interim Final Part 1	Manual	EPA	EPA/540/G-89/006 OSWER 9234.1-01, NTIS: PB90-272535CDH Aug 1988	<a href="http://semspub.epa.gov/work/11/174076.pdf">http://semspub.epa.gov/work/11/174076.pdf</a>
	8	CERCLA Compliance with Other Laws Manual: Part II	Manual	EPA	EPA/540/G-89/009 OSWER 9234.1-02 Aug 1989	<a href="http://semspub.epa.gov/src/document/HQ/174077">http://semspub.epa.gov/src/document/HQ/174077</a>
Community Involvement	15,16	Superfund Community Involvement Handbook	Handbook	EPA	Jan 2016	<a href="https://semspub.epa.gov/work/HQ/100000070.pdf">https://semspub.epa.gov/work/HQ/100000070.pdf</a>
	16	Cost Principles for Non-Profit Organizations	Circular	OMB	OMB Circular A-122 10 May 2004	<a href="https://www.hud.gov/sites/documents/DOC_12492.PDF">https://www.hud.gov/sites/documents/DOC_12492.PDF</a>
Conceptual Site Model	8	E1689-95(2014): Standard Guide for Developing Conceptual Site Models for Contaminated Sites	Guidance	ASTM	2014	<a href="http://www.astm.org/Standards/E1689.htm">http://www.astm.org/Standards/E1689.htm</a>
DSMOA/ Cooperative Agreement	3	DON Environmental Policy Memorandum 03-01: Delegation of Authority to Sign State Cleanup Agreements	Policy	DON	14-Oct-2003	<a href="http://www.navfac.navy.mil/content/dam/navfac/SpecaltyCenters/EngineeringandExpeditionaryWarfareCenter/Environmental/Restoration/er_pdfs/gpr/don-ev-pol-memo-03-01-statesigauth-20031014.pdf">http://www.navfac.navy.mil/content/dam/navfac/SpecaltyCenters/EngineeringandExpeditionaryWarfareCenter/Environmental/Restoration/er_pdfs/gpr/don-ev-pol-memo-03-01-statesigauth-20031014.pdf</a>

**Table A-1 Environmental Restoration References (Continued)**

Subject	DON ERP Manual Chapter #	Document Name	Type	Issued by	Reference	Web Address
DSMOA/ Cooperative Agreement (continued)	3	Navy Implementing Guidance for Department of Defense (DoD) and State Memorandum of Agreement (DSMOA)/Cooperative Agreement Program, Change Order Process and the DON Cost Recovery Process	Guidance	NAVFAC	Ser 9900019/ENC-WS 26 Mar 1999	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/navfac-ev-ltr-dsma-19990326.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/navfac-ev-ltr-dsma-19990326.pdf</a>
	3	Working Together to Achieve Cleanup: A Guide to the Cooperative Agreement Process	Guidance	DoD	Jul-2006	<a href="http://www.hqda.army.mil/acsimweb/brac/RefDocs%5CEnv%5CDSMOA%20Guide%20(Jul%202006).pdf">http://www.hqda.army.mil/acsimweb/brac/RefDocs%5CEnv%5CDSMOA%20Guide%20(Jul%202006).pdf</a>
Emerging Contaminants	13	Aqueous Film Forming Foam Control, Removal and Disposal	Policy	DASN(E)	17 Jun 2016	<a href="http://www.secnave.navy.mil/eie/Documents/Aqueous-Film-Forming-Foam-(AFFF)-Control-Removal-and-Disposal-(1).pdf">http://www.secnave.navy.mil/eie/Documents/Aqueous-Film-Forming-Foam-(AFFF)-Control-Removal-and-Disposal-(1).pdf</a>
	13	Emerging Contaminants	Instruction	DoD	DoDI 4715.18 11 Jun 2009	<a href="http://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/471518p.pdf">http://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/471518p.pdf</a>
	13	DoD Perchlorate Handbook	Handbook	DoD	1 Aug 2007	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/dod-ev-hdbk-perchlorate-200708r1c1.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/dod-ev-hdbk-perchlorate-200708r1c1.pdf</a>
	13	DoD Perchlorate Release Management Policy	Policy	DoD	22 Apr 2009	<a href="http://www.denix.osd.mil/cmrmp/ecmr/perchlorate/policy/general-information/dod-2009-perchlorate-response-policy/">http://www.denix.osd.mil/cmrmp/ecmr/perchlorate/policy/general-information/dod-2009-perchlorate-response-policy/</a>
	13	Frequently Asked Questions: Perfluorinated Compounds (PFC)/Perfluoralkyl Substances (PFAS)	FAQ	DASN(E)	15 Jun 2016	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/p/DASN-PFAS-PFC-FAQ-20160615.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/p/DASN-PFAS-PFC-FAQ-20160615.pdf</a>
	13	Navy Drinking Water Sampling Policy for Perfluorochemicals Perfluorooctane Sulfonate and Perfluorooctanoic Acid	Policy	CNO	5090 N45 Ser/15U132432 14 Sep 2015	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/d/OPNAV-policy-drinkingwater-PFOS-PFOA-20150914.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/d/OPNAV-policy-drinkingwater-PFOS-PFOA-20150914.pdf</a>
	13	Navy Perchlorate Release Management Policy	Policy	CNO	5090 N453C Ser/9U158028 3 Mar 2010	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/cno-ev-pol-perchlorate-rls-20100303.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/cno-ev-pol-perchlorate-rls-20100303.pdf</a>
	13	Navy Perchlorate Sampling and Management Policy	Policy	CNO	5090 N456J Ser/6U838120 16 May 2006	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/cno-ev-pol-perchlorate-smplg-20060516.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/cno-ev-pol-perchlorate-smplg-20060516.pdf</a>



**Table A-1 Environmental Restoration References (Continued)**

Subject	DON ERP Manual Chapter #	Document Name	Type	Issued by	Reference	Web Address
Emerging Contaminants (continued)	13	Perfluorinated Compounds (PFCs) - An Emerging Environmental Issue	Memorandum	DON	21 Oct 2014	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/don-ev-memo-pfc-emerging-20141021.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/don-ev-memo-pfc-emerging-20141021.pdf</a>
	13	Perfluorinated Compounds (PFCs) Drinking Water System Testing Requirement	Policy	DASN (E)	14 Jun 2016	<a href="http://www.secnave.navy.mil/eie/Documents/Perfluorinated-Compounds-(PFCs)-Drinking-Water-System-Testing-Requirement.pdf">http://www.secnave.navy.mil/eie/Documents/Perfluorinated-Compounds-(PFCs)-Drinking-Water-System-Testing-Requirement.pdf</a>
	13	Perfluorinated Compounds/Perfluoroalkyl Substances (PFC/PFAS) – Identification of Potential Areas of Concern (AOCs)	Policy	DASN (E)	20 Jun 2016	<a href="http://www.secnave.navy.mil/eie/Documents/Perfluorinated-Compounds-Perfluoroalkyl-Substances-(PFC-PFAS)-Identification-of-Potential-Areas-of-Concern-(AOCs).pdf">http://www.secnave.navy.mil/eie/Documents/Perfluorinated-Compounds-Perfluoroalkyl-Substances-(PFC-PFAS)-Identification-of-Potential-Areas-of-Concern-(AOCs).pdf</a>
	13	Risk Communication Principles	Guidance	DoD-ECOS	16 Jul 2007	<a href="https://www.ecos.org/documents/emerging-contaminants-risk-communication-principles/">https://www.ecos.org/documents/emerging-contaminants-risk-communication-principles/</a>
	13	Testing for Perfluorochemicals (PFCs) in Drinking Water	Memorandum	BUMED	6280 Ser M387/15UM30462 24 Dec 2015	<a href="http://www.secnave.navy.mil/eie/Documents/15-12-24-BUMED-PFC-Memo-Signed-w-Enclosures.pdf">http://www.secnave.navy.mil/eie/Documents/15-12-24-BUMED-PFC-Memo-Signed-w-Enclosures.pdf</a>
	13	Testing DoD Drinking Water for Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA)	Policy	DoD	10 Jun 2016	<a href="https://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/16-06-10%20Testing%20drinking%20water%20PFOS%20PFOA.pdf">https://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/16-06-10%20Testing%20drinking%20water%20PFOS%20PFOA.pdf</a>
Environmental Justice	1,14	Executive Order 12898 Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations	EO	WHITE HOUSE	59 FR 7629 16 Feb 1994	<a href="http://www.archives.gov/federal-register/executive-orders/pdf/12898.pdf">http://www.archives.gov/federal-register/executive-orders/pdf/12898.pdf</a>
	1,16	Strategy on Environmental Justice	Policy	DoD	25 Mar 1995	<a href="http://www.denix.osd.mil/references/dod/strategy/dod-environmental-justice-strategy/">http://www.denix.osd.mil/references/dod/strategy/dod-environmental-justice-strategy/</a>
Federal Facilities Agreement	3	Fort Eustis Federal Facility Agreement	Example Template	EPA, Virginia & Army	CERC-03-2008-0063FF	<a href="http://www.denix.osd.mil/references/dod/policy-guidance/epa-and-department-of-the-army-agreement/">http://www.denix.osd.mil/references/dod/policy-guidance/epa-and-department-of-the-army-agreement/</a>
Five-Year Review	11	Policy for Conducting CERCLA Five-Year Reviews	Policy	CNO	5090 N453 Ser/11U158119 7 Jun 2011	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/nmc-ev-pol-5yr-rvw-20110607.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/nmc-ev-pol-5yr-rvw-20110607.pdf</a>
Funding	3	Environmental Restoration	Policy	CNO	5090 Ser N453/5U597821 16 Jan 1996	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/don-ev-pol-memo-95-04-devolvedera-19960106.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/don-ev-pol-memo-95-04-devolvedera-19960106.pdf</a>

**Table A-1 Environmental Restoration References (Continued)**

Subject	DON ERP Manual Chapter #	Document Name	Type	Issued by	Reference	Web Address
Funding (continued)	4	Environmental Restoration, Navy (ER,N) Program Activity Salary and Support Funding	Guidance	NAVFAC	Ser 009003/ENC-MD 10 Feb 2014	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/navfac-ev-guid-acty-sal-sprt-20140210.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/navfac-ev-guid-acty-sal-sprt-20140210.pdf</a>
	14	Remediation Costs Associated with Defense Logistics Agency/Defense Energy Support Center (DLA/DESC) MILCON Projects on Navy Installations	Guidance	CNO	5090 Ser N45/5U901466 15 Nov 2005	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/cno-ev-pol-dladesec-remfunds-20051115.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/cno-ev-pol-dladesec-remfunds-20051115.pdf</a>
GSR	1	Executive Order 13693 Planning for Federal Sustainability in the Next Decade	EO	WHITE HOUSE	80 FR 15871; 19 Mar 2015	<a href="https://www.gpo.gov/fdsys/pkg/FR-2015-06-15/html/2015-14501.htm">https://www.gpo.gov/fdsys/pkg/FR-2015-06-15/html/2015-14501.htm</a>
	8,10,11	DON Guidance on Green and Sustainable Remediation	Guidance	NAVFAC	UG-2093-ENV Rev 1. Apr 2012	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/navfacesc-ev-ug-2093-env-gsr-20120405r1.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/navfacesc-ev-ug-2093-env-gsr-20120405r1.pdf</a>
Health & Safety	17	Occupational Safety and Health Program Manual	Manual	DON	OPNAVINST 5100.23G 21 Jul 2011	<a href="http://www.public.navy.mil/NAVSAFECEN/Documents/OSH/SafetyOfficer/5100.23G_CH-1_with_updated_links.pdf">http://www.public.navy.mil/NAVSAFECEN/Documents/OSH/SafetyOfficer/5100.23G_CH-1_with_updated_links.pdf</a>
	17	Safety and Health Requirements Manual	Manual	USACE	U.S. Army Corps of Engineers (USACE) Engineering Manual (EM) 385-1-1	<a href="http://www.usace.army.mil/SafetyandOccupationalHealth/SafetyandHealthRequirementsManual.aspx">http://www.usace.army.mil/SafetyandOccupationalHealth/SafetyandHealthRequirementsManual.aspx</a>
	17	Site-Specific HASP Review Checklist	Checklist	NMCPHC	1 Jan 2010	<a href="http://www.med.navy.mil/sites/nmcphc/Documents/environmental-programs/health-and-safety/hasp_checklist_jan2010.pdf">http://www.med.navy.mil/sites/nmcphc/Documents/environmental-programs/health-and-safety/hasp_checklist_jan2010.pdf</a>

**Table A-1 Environmental Restoration References (Continued)**

Subject	DON ERP Manual Chapter #	Document Name	Type	Issued by	Reference	Web Address
Health & Safety (continued)	17	Standard Operating Safety Guides	Guidance	EPA	OSWER 9285.1-03 Jun 1992	<a href="http://nepis.epa.gov/Exe/ZyNET.exe/2000FZTQ.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1991+Thru+1994&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5Cindex%20Data%5C91thru94%5CTxt%5C00000014%5C2000FZTQ.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyDegree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425&amp;Display=p%7Cf&amp;DefSeekPage=x&amp;SearchBack=ZyActionL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;MaximumPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURL">http://nepis.epa.gov/Exe/ZyNET.exe/2000FZTQ.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1991+Thru+1994&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5Cindex%20Data%5C91thru94%5CTxt%5C00000014%5C2000FZTQ.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyDegree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425&amp;Display=p%7Cf&amp;DefSeekPage=x&amp;SearchBack=ZyActionL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;MaximumPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURL</a>
Investigation-Derived Wastes	8	Guide to Management of Investigation-Derived Wastes	Guidance	EPA	OSWER 9345.3-03FS 15 Jan 1992	<a href="http://nepis.epa.gov/Exe/ZyNET.exe/P100L3QK.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1991+Thru+1994&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5Cindex%20Data%5C91thru94%5CTxt%5C00000030%5CP100L3QK.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyDegree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425&amp;Display=p%7Cf&amp;DefSeekPage=x&amp;SearchBack=ZyActionL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;MaximumPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURLf">http://nepis.epa.gov/Exe/ZyNET.exe/P100L3QK.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1991+Thru+1994&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5Cindex%20Data%5C91thru94%5CTxt%5C00000030%5CP100L3QK.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyDegree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425&amp;Display=p%7Cf&amp;DefSeekPage=x&amp;SearchBack=ZyActionL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;MaximumPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURLf</a>
Land Use Controls	7	Considering Reasonably Anticipated Future Land Use and Reducing Barriers to Reuse at EPA-lead Superfund Remedial Sites	Guidance	EPA	OSWER 9355.7-19 17 Mar 2010	<a href="https://semspub.epa.gov/work/HQ/175563.pdf">https://semspub.epa.gov/work/HQ/175563.pdf</a>
	7,14	DoD Policy on Responsibility for Additional Environmental Cleanup after Transfer of Real Property	Policy	DoD	25 Apr 2005	<a href="http://www.denix.osd.mil/derp/archives/guidance/unsigned/dod-policy-on-responsibility-for-additional-environmental-cleanup-after-transfer-of-real-property/">http://www.denix.osd.mil/derp/archives/guidance/unsigned/dod-policy-on-responsibility-for-additional-environmental-cleanup-after-transfer-of-real-property/</a>
	7	Guidance on Land Use Control Agreements with Environmental Regulatory Agencies	Guidance	DoD	2 Mar 2001	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/dod-ev-guid-luc-agrmts-20010402.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/dod-ev-guid-luc-agrmts-20010402.pdf</a>
	7,8,14	Land Use in the CERCLA Remedy Selection Process	Guidance	EPA	OSWER 9355.7-04 25 May 1995	<a href="http://www2.epa.gov/sites/production/files/document/s/landuse.pdf">http://www2.epa.gov/sites/production/files/document/s/landuse.pdf</a>

**Table A-1 Environmental Restoration References (Continued)**

Subject	DON ERP Manual Chapter #	Document Name	Type	Issued by	Reference	Web Address
Land Use Controls (continued)	7,11	Policy Memorandum 99-02; Land Use Controls	Policy	DON	Interim Final - 25 May 1999	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/don-ev-pol-memo-99-02-lucs-19990522if.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/don-ev-pol-memo-99-02-lucs-19990522if.pdf</a>
	7,14	Reuse Assessments: A Tool to Implement the Superfund Land Use Directive	Guidance	EPA	OSWER 9355.7-06P 4 Jun 2001	<a href="https://clu-in.org/download/toolkit/thirdednew/reuseassessstool.pdf">https://clu-in.org/download/toolkit/thirdednew/reuseassessstool.pdf</a>
	11	Implementation of the Land Use Control (LUC) Tracker	Guidance	NAVFAC	5090 Ser 11009 / ENC-RS 27 Jul 2011	<a href="https://hub.navfac.navy.mil:443/webcenter/faces/owResource.jspx?z=oracle.webcenter.doclib%21sc53066fe16d_4da9_9fe4_5ad42712e7a8%21WebCenterSpaces-ucm%2523dDocName%253AID_017405%21%21don-ev-guid-lucracimpl-20110727.pdf">https://hub.navfac.navy.mil:443/webcenter/faces/owResource.jspx?z=oracle.webcenter.doclib%21sc53066fe16d_4da9_9fe4_5ad42712e7a8%21WebCenterSpaces-ucm%2523dDocName%253AID_017405%21%21don-ev-guid-lucracimpl-20110727.pdf</a>
	11	Monitoring and Enforcement of Land Use Controls	Policy	DON	2 Apr 2003	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/secnav-ev-pol-lucs-enforce-2003-04-02.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/secnav-ev-pol-lucs-enforce-2003-04-02.pdf</a>
	11	Policy on Land Use Controls Associated with Environmental Restoration Activities	Policy	DoD	17 Jan 2001	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/dod-ev-pol-luc-in-er-20010117.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/dod-ev-pol-luc-in-er-20010117.pdf</a>
Lead Based Paint	13	Lead Based Paint Guidance/Frequently Asked Questions	FAQs	NAVFAC	5090 Ser 13008/EV3-KB 31 Jan 2014	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/navfac-ev-guid-lbp-20140131f.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/navfac-ev-guid-lbp-20140131f.pdf</a>
Legal	2	Responsibility of the Judge Advocate General of the Navy and the Staff Judge Advocate to the Commandant of the Marine Corps for Supervision and Provision of Certain Legal Services	Instruction	SECNAV	SECNAVINST 5430.27D OJAG (Code 13) 25 Apr 2011	<a href="http://doni.documentservices.dla.mil/Directives/05000 General Management Security and Safety Services/05-400 Organization and Functional Support Services/5430.27D.pdf">http://doni.documentservices.dla.mil/Directives/05000 General Management Security and Safety Services/05-400 Organization and Functional Support Services/5430.27D.pdf</a>
	2	The General Counsel of the Navy; Assignment of Responsibilities	Instruction	SECNAV	SECNAVINST 5430.25E OGC 27 Dec 2005	<a href="http://doni.documentservices.dla.mil/Directives/05000 General Management Security and Safety Services/05-400 Organization and Functional Support Services/5430.25E.pdf">http://doni.documentservices.dla.mil/Directives/05000 General Management Security and Safety Services/05-400 Organization and Functional Support Services/5430.25E.pdf</a>

**Table A-1 Environmental Restoration References (Continued)**

Subject	DON ERP Manual Chapter #	Document Name	Type	Issued by	Reference	Web Address
Legal (continued)	14	Department of the Navy Environmental Policy Memorandum 02-01; Third Party Sites and Affirmative CERCLA Claims	Policy	DON	DASN(E) Memo 28 Jan 2002	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/don-ev-pol-memo-02-01-3rdpartyclaims-20020128.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/don-ev-pol-memo-02-01-3rdpartyclaims-20020128.pdf</a>
Monitoring	10	Guidance for Monitoring at Hazardous Waste Sites: Framework for Monitoring Plan Development and Implementation	Guidance	EPA	OSWER 9355.4-28 1 Jan 2004	<a href="https://clu-in.org/download/char/oswerdirective9355jan04.pdf">https://clu-in.org/download/char/oswerdirective9355jan04.pdf</a>
Munitions Response	2	Explosives Safety Review, Oversight, and Verification of Response Actions Involving Military Munitions	Instruction	OPNAV	OPNAVINST 8020.15A MCO 8020.13A N41/CMC (I&L) 27 Feb 2008	<a href="https://doni.daps.dla.mil/Directives/08000%20Ordnance%20Material%20Management%20and%20Support/08-00%20General%20Ordnance%20Material%20Support/8020.15A.pdf">https://doni.daps.dla.mil/Directives/08000%20Ordnance%20Material%20Management%20and%20Support/08-00%20General%20Ordnance%20Material%20Support/8020.15A.pdf</a>
	4,15	Munitions Response Site Prioritization Protocol Primer	Manual	DoD	30 Apr 2007	<a href="http://www.denix.osd.mil/mmrrp/mrspp/home/unassigned/protocol-primer/">http://www.denix.osd.mil/mmrrp/mrspp/home/unassigned/protocol-primer/</a>
	12,17	Ammunition and Explosives Ashore, Safety Regulations for Handling, Storing, Production, Renovation, and Shipping	Pamphlet	NAVSEA	NAVSEA Ordnance Pamphlet 5 (OP 5) Vol. 1 7th Rev.	<a href="http://www.navsea.navy.mil/Home/NOSSA.aspx">http://www.navsea.navy.mil/Home/NOSSA.aspx</a>
	12	DoD Ammunition and Explosives Safety Standards	Manual	DoD	DoD 6055.09-STD Incorporating Change 2 21 Aug 2009	<a href="http://www.dtic.mil/whs/directives/corres/pdf/605509m/605509-M-V7.pdf">http://www.dtic.mil/whs/directives/corres/pdf/605509m/605509-M-V7.pdf</a>
	12	Example After Action Report (AAR)	Guidance	NAVFAC	Apr 2011	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/a/navfacmw-ev-rpt-nsacrane-aar-minefill-201104.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/a/navfacmw-ev-rpt-nsacrane-aar-minefill-201104.pdf</a>
	12	Explosives Safety Review, Oversight, and Verification of Munitions Responses	Instruction	NOSSA	NOSSAINST 8020.15 (series)	<a href="http://www.navsea.navy.mil/Home/NOSSA.aspx">http://www.navsea.navy.mil/Home/NOSSA.aspx</a>
	12	Geophysical System Verification (GSV): A Physics-Based Alternative to Geophysical Prove-Outs for Munitions Response	Report	ESTCP	1 Jul 2009	<a href="http://www.serdp.org/content/download/.../geosysverif-july-09-final.pdf">www.serdp.org/content/download/.../geosysverif-july-09-final.pdf</a>
	12	Implementing Advanced Classification on Munitions Response Sites: A Guide to Informed Decision Making For Project Managers, Regulators, and Contractors	Guidance	ESTCP	1 Dec 2011	<a href="http://www.serdp.org/Tools-and-Training/Munitions-Response/Classification-in-Munitions-Response/Implementing-Advanced-Classification-on-Munitions-Response-Sites-A-Guide-to-Informed-Decision-Making-For-Project-Managers-Regulators-and-Contractors">http://www.serdp.org/Tools-and-Training/Munitions-Response/Classification-in-Munitions-Response/Implementing-Advanced-Classification-on-Munitions-Response-Sites-A-Guide-to-Informed-Decision-Making-For-Project-Managers-Regulators-and-Contractors</a>

**Table A-1 Environmental Restoration References (Continued)**

Subject	DON ERP Manual Chapter #	Document Name	Type	Issued by	Reference	Web Address
Munitions Response (continued)	12	Marine Corps Explosives Safety Management Program	Order	CMC	MCO 8020.10 10 Jun 2015	<a href="http://www.marines.mil/Portals/59/MCO%208020.10.pdf">http://www.marines.mil/Portals/59/MCO%208020.10.pdf</a>
	12	Munitions and Explosives of Concern Hazard Assessment Methodology	Methodology	EPA	EPA: 505B08001 Oct 2008	<a href="http://www.epa.gov/sites/production/files/documents/mec_ha_methodology_interim.pdf">http://www.epa.gov/sites/production/files/documents/mec_ha_methodology_interim.pdf</a>
	12	Munitions Response Historical Records Review	Report	ITRC	1 Nov 2003	<a href="http://www.itrcweb.org/Documents/UXO-2.pdf">http://www.itrcweb.org/Documents/UXO-2.pdf</a>
	12	Munitions Response Remedial Investigation / Feasibility Study Guidance	Guidance	Army	Nov 2009	<a href="https://aec.army.mil/application/files/8114/9512/9332/Guidance_MMRP_RIFS_2009.pdf">https://aec.army.mil/application/files/8114/9512/9332/Guidance_MMRP_RIFS_2009.pdf</a>
	12	Quality Considerations for Munitions Response Projects	Report	ITRC	Oct 2008	<a href="http://www.itrcweb.org/Guidance/GetDocument?documentID=102">http://www.itrcweb.org/Guidance/GetDocument?documentID=102</a>
	12,17	Standard Operating Procedures Development, Implementation, and Maintenance for Ammunition and Explosives	Instruction	NOSSA	NOSSAINST 8023.11A 20 Aug 2004	<a href="http://www.navsea.navy.mil/Home/NOSSA.aspx">http://www.navsea.navy.mil/Home/NOSSA.aspx</a>
	12	Statement of Work (SOW) Template for Quality Assessment at a Munitions Response Site (MRS)	Template	NAVFAC	Jul 2012	<a href="http://navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/q/navfac-ev-tmpl-mr-sow-qa-20120712.pdf">http://navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/q/navfac-ev-tmpl-mr-sow-qa-20120712.pdf</a>
Natural Resource Injury	8,9,14	Policy on Natural Resource Injury and Damages in the Installation Restoration Program	Policy	CNO	21 Dec 2001	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/cno-ev-pol-nri-irp-20010421.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/cno-ev-pol-nri-irp-20010421.pdf</a>
Optimization	7,8,10,11	Policy for Optimizing Remedial and Removal Actions at all DON Environmental Restoration Program Sites	Policy	NAVFAC	5090 Ser 12005/EV3-KB 2 Apr 2012	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/don-ev-pol-opt-actions-20120402.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/don-ev-pol-opt-actions-20120402.pdf</a>
	8,10	Guidance for Optimizing Remedial Action Operation (RA-O)	Guidance	NAVFAC	UG-NAVFAC EXWC-EV-1301 Nov 2012	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/navfacexwc-ev-ug-1301-opt-rao-20121001.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/navfacexwc-ev-ug-1301-opt-rao-20121001.pdf</a>
	8,9,10	Guidance for Optimizing Remedy Evaluation, Selection, and Design	Guidance	NAVFAC	US-2087-ENV 9 Mar 2010	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/navfacesc-ev-ug-2087-env-opt-remedy-20100309.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/navfacesc-ev-ug-2087-env-opt-remedy-20100309.pdf</a>

**Table A-1 Environmental Restoration References (Continued)**

Subject	DON ERP Manual Chapter #	Document Name	Type	Issued by	Reference	Web Address
Optimization (continued)	10,11	Guidance for Planning and Optimizing Monitoring Strategies	Guidance	NAVFAC	US-2081-ENV Rev 1 Nov 2010	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/navfacesc-ev-ug-2081-env-opt-mon-201011r1.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/navfacesc-ev-ug-2081-env-opt-mon-201011r1.pdf</a>
	8	Remedial Alternatives Analysis (RAA) Guidance	Guidance	NAVFAC	1 Apr 2012	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/r/navfac-ev-guid-raa-20120404.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/r/navfac-ev-guid-raa-20120404.pdf</a>
	10	Navy Environmental Restoration Program Management and Monitoring Approach	Guidance	NAVFAC	1 May 2012	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/m/navfac-ev-pres-mma-20120503v2.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/m/navfac-ev-pres-mma-20120503v2.pdf</a>
Preliminary Assessment/Site Inspection	6	Guidance for Performing Preliminary Assessments Under CERCLA	Guidance	EPA	EPA/540/G-91/013 Sep 1991	<a href="http://nepis.epa.gov/Exe/ZyNET.exe/20012GDU.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1991+Thru+1994&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5CInd ex%20Data%5C91thru94%5CTxt%5C00000017%5C2001 2GDU.txt&amp;User=ANONYMOUS&amp;Password=anonymous &amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyD egree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i42 5&amp;Display=p%7Cf&amp;DefSeekPage=x&amp;SearchBack=ZyActi onL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;Max imumPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURL">http://nepis.epa.gov/Exe/ZyNET.exe/20012GDU.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1991+Thru+1994&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5CInd ex%20Data%5C91thru94%5CTxt%5C00000017%5C2001 2GDU.txt&amp;User=ANONYMOUS&amp;Password=anonymous &amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyD egree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i42 5&amp;Display=p%7Cf&amp;DefSeekPage=x&amp;SearchBack=ZyActi onL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;Max imumPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURL</a>
	6	Guidance for Performing Site Inspections Under CERCLA	Guidance	EPA	OSWER 9345.1-05 Sep 1992	<a href="http://nepis.epa.gov/Exe/ZyNET.exe/2000IRVN.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1991+Thru+1994&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5CInd ex%20Data%5C91thru94%5CTxt%5C00000014%5C2000 IRVN.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp; SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyD egree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425 &amp;Display=p%7Cf&amp;DefSeekPage=x&amp;SearchBack=ZyActio nL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;Maxi mumPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURL">http://nepis.epa.gov/Exe/ZyNET.exe/2000IRVN.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1991+Thru+1994&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5CInd ex%20Data%5C91thru94%5CTxt%5C00000014%5C2000 IRVN.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp; SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyD egree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425 &amp;Display=p%7Cf&amp;DefSeekPage=x&amp;SearchBack=ZyActio nL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;Maxi mumPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURL</a>

**Table A-1 Environmental Restoration References (Continued)**

Subject	DON ERP Manual Chapter #	Document Name	Type	Issued by	Reference	Web Address
Preliminary Assessment/Site Inspection (continued)	6	Improving Site Assessment: Abbreviated Preliminary Assessments	Guidance	EPA	EPA/540/F-98/037 Oct 1999	<a href="http://nepis.epa.gov/Exe/ZyNET.exe/9101ALZE.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1995+Thru+1999&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5Cindex%20Data%5C95thru99%5CTxt%5C00000033%5C9101ALZE.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyDegree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425&amp;Display=p%7Cf&amp;DefSeekPage=x&amp;SearchBack=ZyActionL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;MaximumPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURL#">http://nepis.epa.gov/Exe/ZyNET.exe/9101ALZE.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1995+Thru+1999&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5Cindex%20Data%5C95thru99%5CTxt%5C00000033%5C9101ALZE.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyDegree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425&amp;Display=p%7Cf&amp;DefSeekPage=x&amp;SearchBack=ZyActionL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;MaximumPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURL#</a>
	6	Improving Site Assessment: Combined PA/SI Assessments	Guidance	EPA	EPA/540/F-98/038 Oct 1999	<a href="http://nepis.epa.gov/Exe/ZyNET.exe/9101ALZK.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1995+Thru+1999&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5Cindex%20Data%5C95thru99%5CTxt%5C00000033%5C9101ALZK.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyDegree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425&amp;Display=p%7Cf&amp;DefSeekPage=x&amp;SearchBack=ZyActionL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;MaximumPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURL#">http://nepis.epa.gov/Exe/ZyNET.exe/9101ALZK.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1995+Thru+1999&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5Cindex%20Data%5C95thru99%5CTxt%5C00000033%5C9101ALZK.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyDegree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425&amp;Display=p%7Cf&amp;DefSeekPage=x&amp;SearchBack=ZyActionL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;MaximumPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURL#</a>
	6	Improving Site Assessment: Integrating Removal and Remedial Site Evaluations	Guidance	EPA	EPA/540/F-99/006 Apr 2000	<a href="http://nepis.epa.gov/Exe/ZyNET.exe/10001V5C.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1995+Thru+1999&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5Cindex%20Data%5C95thru99%5CTxt%5C00000014%5C10001V5C.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyDegree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425&amp;Display=p%7Cf&amp;DefSeekPage=x&amp;SearchBack=ZyActionL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;MaximumPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURL#">http://nepis.epa.gov/Exe/ZyNET.exe/10001V5C.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1995+Thru+1999&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5Cindex%20Data%5C95thru99%5CTxt%5C00000014%5C10001V5C.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyDegree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425&amp;Display=p%7Cf&amp;DefSeekPage=x&amp;SearchBack=ZyActionL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;MaximumPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURL#</a>



**Table A-1 Environmental Restoration References (Continued)**

Subject	DON ERP Manual Chapter #	Document Name	Type	Issued by	Reference	Web Address
Preliminary Assessment/Site Inspection (continued)	6	The Federal Facilities Remedial Preliminary Assessment Summary Guide	Guidance	EPA	21 Jul 2005	<a href="http://www2.epa.gov/sites/production/files/document/s/ff_pa_guide.pdf">http://www2.epa.gov/sites/production/files/document/s/ff_pa_guide.pdf</a>
Program Guidance/Policy	1,2,3,4,10,13,14	Defense Environmental Restoration Program (DERP) Management Manual	Manual	DoD	4715.20 9 Mar 2012	<a href="https://www.navfac.navy.mil/navfac_worldwide/specialty_centers/exwc/products_and_services/ev/erb/gpr.html">https://www.navfac.navy.mil/navfac_worldwide/specialty_centers/exwc/products_and_services/ev/erb/gpr.html</a>
	1,2,13,14,15,16,18	Environmental Readiness Program Manual	Manual	OPNAV	OPNAV M-5090.1 10 Jan 2014	<a href="https://doni.documentservices.dla.mil/SECNAV%20Manuals1/5090.1.pdf">https://doni.documentservices.dla.mil/SECNAV%20Manuals1/5090.1.pdf</a>
	1	Executive Order 12088 Federal Compliance with Pollution Control Standards	EO	WHITE HOUSE	43 FR 47707, 3 CFR, 1978 Comp., p. 243 13 Oct 1978	<a href="http://www.archives.gov/federal-register/codification/executive-order/12088.html">http://www.archives.gov/federal-register/codification/executive-order/12088.html</a>
	1,13,14,15,16,18	Marine Corps Environmental Compliance and Protection Manual	Manual	Marine Corps	Marine Corps Order (MCO) P5090.2A 26 Aug 2013	<a href="http://www.marines.mil/Portals/59/MCO%20P5090.2A%20W%20CH%201-3.pdf">http://www.marines.mil/Portals/59/MCO%20P5090.2A%20W%20CH%201-3.pdf</a>
	1	Presumptive Response Strategy and Ex Situ Treatment Technologies for Contaminated Groundwater at CERCLA Sites, Final Guidance	Guidance	EPA	OSWER 9283.1-12 Oct 1996	<a href="http://nepis.epa.gov/Exe/ZyNET.exe/100027Z4.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1995+Thru+1999&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5CIndex%20Data%5C95thru99%5CTxt%5C00000004%5C100027Z4.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyDegree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425&amp;Display=p%7Cf&amp;DefSeekPage=x&amp;SearchBack=ZyActionL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;MaximumPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURL">http://nepis.epa.gov/Exe/ZyNET.exe/100027Z4.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1995+Thru+1999&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5CIndex%20Data%5C95thru99%5CTxt%5C00000004%5C100027Z4.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyDegree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425&amp;Display=p%7Cf&amp;DefSeekPage=x&amp;SearchBack=ZyActionL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;MaximumPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURL</a>

**Table A-1 Environmental Restoration References (Continued)**

Subject	DON ERP Manual Chapter #	Document Name	Type	Issued by	Reference	Web Address
Program Guidance/Policy (continued)	2	Environmental Compliance Guide for Commanding Officers of Navy Installations	Guidance	CNIC	2010 Apr	<a href="https://hub.navfac.navy.mil/webcenter/faces/oracle/webcenter/webcenterapp/view/pages/shared/ResourceViewer.jspx?wc.taskFlowId=doclib-folder-viewer&amp;immediate=true&amp;resourceId=WebCenterSpace-s-ucm%23dDocName%3AID_091650&amp;resourceScope=s-a075c8f0_1a89_4619_a84a_f115a2f50460&amp;keywords=commanding+officer%27s+guide+to+environmental&amp;se-viceId=oracle.webcenter.doclib&amp;wc.taskFlowPath=%2Foracle%2Fwebcenter%2Fdoclib%2Fview%2Fjsf%2Ftaskflows%2FfolderViewer%2FfolderView.xml&amp;-adf.ctrl-state=qz7arnnvi_4&amp;wc.contextURL=%2Fspaces%2Fev&amp;wc.tabLabel=Environmental+Compliance+Guide+for+C-Of+Navy+Installations+26+July+2010+Versio&amp;-af-Lo-op=4346857618227#!">https://hub.navfac.navy.mil/webcenter/faces/oracle/webcenter/webcenterapp/view/pages/shared/ResourceViewer.jspx?wc.taskFlowId=doclib-folder-viewer&amp;immediate=true&amp;resourceId=WebCenterSpace-s-ucm%23dDocName%3AID_091650&amp;resourceScope=s-a075c8f0_1a89_4619_a84a_f115a2f50460&amp;keywords=commanding+officer%27s+guide+to+environmental&amp;se-viceId=oracle.webcenter.doclib&amp;wc.taskFlowPath=%2Foracle%2Fwebcenter%2Fdoclib%2Fview%2Fjsf%2Ftaskflows%2FfolderViewer%2FfolderView.xml&amp;-adf.ctrl-state=qz7arnnvi_4&amp;wc.contextURL=%2Fspaces%2Fev&amp;wc.tabLabel=Environmental+Compliance+Guide+for+C-Of+Navy+Installations+26+July+2010+Versio&amp;-af-Lo-op=4346857618227#!</a>
	2	Marine Corps Commander's Guide to Environmental Management	Guidance	MCICOM	2014	<a href="http://www.iandl.marines.mil/Portals/85/Docs/USMC-Commanders%20Guide_2014.pdf">http://www.iandl.marines.mil/Portals/85/Docs/USMC-Commanders%20Guide_2014.pdf</a>
Projects in Foreign Countries	1	Remediation of Environmental Contamination Outside the United States	Instruction	DoD	DoD Instruction 4715.08 10 Oct 2017	<a href="http://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/471508p.pdf">http://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/471508p.pdf</a>
Property Acquisition	14	All Appropriate Inquiries Regulations	Law	Congress	40 CFR Section 312.1 Nov 2005	<a href="https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr312_main_02.tpl">https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr312_main_02.tpl</a>
Public Participation	16	DoD RAB Rule	Rule	DoD	12 May 2006	<a href="https://www.gpo.gov/fdsys/pkg/FR-2006-05-12/pdf/06-4246.pdf">https://www.gpo.gov/fdsys/pkg/FR-2006-05-12/pdf/06-4246.pdf</a>
	16	DoD's Restoration Advisory Board Rule Handbook	Handbook	DoD	1 Mar 2007	<a href="http://www.denix.osd.mil/rab/home/unassigned/rab-rule-handbook/">http://www.denix.osd.mil/rab/home/unassigned/rab-rule-handbook/</a>
	16	Establishment of Restoration Advisory Boards (RABs)	Guidance	CNO	5090 Ser 453C/4U596021 9 Feb 1994	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er-pdfs/gpr/cno-ev-pol-estab%20rabs-1994-02-09.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er-pdfs/gpr/cno-ev-pol-estab%20rabs-1994-02-09.pdf</a>
	4,16	Technical Assistance for Public Participation	Guidance	DoD	1 Feb 2000	<a href="http://www.dtic.mil/dtic/tr/fulltext/u2/a376044.pdf">http://www.dtic.mil/dtic/tr/fulltext/u2/a376044.pdf</a>
	16	Technical Assistance for Public Participation (TAPP) Application	Form	DoD	DD Form 2749 Dec 1996	<a href="http://www.esd.whs.mil/Portals/54/Documents/DD/forms/dd/dd2749.pdf">http://www.esd.whs.mil/Portals/54/Documents/DD/forms/dd/dd2749.pdf</a>
QA/QC	6,8	Uniform Federal Policy for Quality Assurance Project Plans Manual	Policy	EPA	EPA/505/B-04/900A Mar 2005	<a href="http://www2.epa.gov/sites/production/files/document/s/ufp_gapp_v1_0305.pdf">http://www2.epa.gov/sites/production/files/document/s/ufp_gapp_v1_0305.pdf</a>
	8	Acquisitions Involving Environmental Sampling or Testing Services	Policy	DoD	4 Dec 2007	<a href="http://www.acq.osd.mil/dpap/dars/dfars/changenotice/2008/20080303/223.7.pdf">http://www.acq.osd.mil/dpap/dars/dfars/changenotice/2008/20080303/223.7.pdf</a>

**Table A-1 Environmental Restoration References (Continued)**

Subject	DON ERP Manual Chapter #	Document Name	Type	Issued by	Reference	Web Address
QA/QC (continued)	8	DoD Environmental Quality Systems	Instruction	DoD	DoDI 4715.15 25 Oct 2017	<a href="http://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/471515p.pdf">http://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/471515p.pdf</a>
	8	Guidance on Systematic Planning Using the Data Quality Objectives Process	Guidance	EPA	EPA QA/G-4 Feb 2006	<a href="http://www2.epa.gov/sites/production/files/document/s/guidance_systematic_planning_dqo_process.pdf">http://www2.epa.gov/sites/production/files/document/s/guidance_systematic_planning_dqo_process.pdf</a>
	8	DoD Quality Systems Manual ( QSM) Version 5.0	Manual	DoD	July 2013	<a href="http://www.denix.osd.mil/edqw/home/what-s-new/unassigned/gsm-version-5-0-final/">http://www.denix.osd.mil/edqw/home/what-s-new/unassigned/gsm-version-5-0-final/</a>
Radiological	13	DON Policy on Activities Involving General Radioactive Material (G-RAM) at Environmental Restoration Program Sites	Policy	CNO	5090 Ser N453/10U158072 18 Feb 2010	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/don-ev-pol-er-g-ram-20100218.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/don-ev-pol-er-g-ram-20100218.pdf</a>
	13	Low Level Radioactive Waste Disposal Program	Regulation	DoD	DoD 4715.27 7 Jul 2017	<a href="http://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/471527_dodi_2017.pdf">http://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/471527_dodi_2017.pdf</a>
	13	Post Historical Radiological Assessment (HRA) Site Indoctrination Guidance	Guidance	NAVFAC	20 Sep 2017	<a href="https://hub.navfac.navy.mil/webcenter/portal/exwc/Business+Lines/Environmental+Security/ERB-Environmental+Restoration+and+BRAC/WG-RAD?_afLoop=5532134255537#!%40%40%3F_afLoop%3D5532134255537%26centerWidth%3D100%2525%26lastReviewedDate%3D6%2BApril%2B2016%26leftWidth%3D0%2525%26pocEmail%3Dtara.meyers%2540navy.mil%26rightWidth%3D0%2525%26showFooter%3Dfalse%26showHeader%3Dfalse%26_adf.ctrl-state%3Dy9k1nwwc_4">https://hub.navfac.navy.mil/webcenter/portal/exwc/Business+Lines/Environmental+Security/ERB-Environmental+Restoration+and+BRAC/WG-RAD?_afLoop=5532134255537#!%40%40%3F_afLoop%3D5532134255537%26centerWidth%3D100%2525%26lastReviewedDate%3D6%2BApril%2B2016%26leftWidth%3D0%2525%26pocEmail%3Dtara.meyers%2540navy.mil%26rightWidth%3D0%2525%26showFooter%3Dfalse%26showHeader%3Dfalse%26_adf.ctrl-state%3Dy9k1nwwc_4</a>
RCRA	1	Management of Remediation Waste Under RCRA	Guidance	EPA	EPA530-F-98-026 Oct 1998	<a href="https://www.epa.gov/sites/production/files/2013-10/documents/remediawaste-rpt.pdf">https://www.epa.gov/sites/production/files/2013-10/documents/remediawaste-rpt.pdf</a>
	13	Coordination Between RCRA Corrective Action and Closure and CERCLA Site Activities	Guidance	EPA	EC-G-2002-008 24 Sep 1996	<a href="http://www.epa.gov/sites/production/files/2013-10/documents/rcracorrection-mem.pdf">http://www.epa.gov/sites/production/files/2013-10/documents/rcracorrection-mem.pdf</a>
	13	Final Guidance on Completion of Corrective Action Activities at RCRA Facilities	Guidance	EPA	68 FR 8757 25 Feb 2003	<a href="https://yosemite.epa.gov/osw/rcra.nsf/ea6e50dc6214725285256bf00063269d/DAE2FBFE4BE1CDD085256D1600748BBD/\$file/14653.pdf">https://yosemite.epa.gov/osw/rcra.nsf/ea6e50dc6214725285256bf00063269d/DAE2FBFE4BE1CDD085256D1600748BBD/\$file/14653.pdf</a>
	13	Improving RCRA/CERCLA Coordination at Federal Facilities	Directive	EPA	OSWER Directive 9272.0-22 21 Dec 2005	<a href="http://www.epa.gov/sites/production/files/documents/oswerdir9272_0-22.pdf">http://www.epa.gov/sites/production/files/documents/oswerdir9272_0-22.pdf</a>
	13	RCRA Orientation Manual	Manual	EPA	EPA/530/F-11/003 Oct 2014	<a href="http://www.epa.gov/sites/production/files/2015-07/documents/rom.pdf">http://www.epa.gov/sites/production/files/2015-07/documents/rom.pdf</a>
	13	RCRA Corrective Action Plan	Guidance	EPA	OSWER 9902.3-2A May 1994	<a href="https://www.epa.gov/sites/production/files/2013-10/documents/rcracactionpln-rpt.pdf">https://www.epa.gov/sites/production/files/2013-10/documents/rcracactionpln-rpt.pdf</a>
Real Estate	13,14	NAVFAC Real Estate Procedural Manual	Manual	NAVFAC	NAVFAC P-73 Apr 2009	<a href="https://www.navfac.navy.mil/products_and_services/am/about_us/resources.html">https://www.navfac.navy.mil/products_and_services/am/about_us/resources.html</a>

**Table A-1 Environmental Restoration References (Continued)**

Subject	DON ERP Manual Chapter #	Document Name	Type	Issued by	Reference	Web Address
Real Estate (continued)	14	Policy for Streamlining the Assessment, Documentation, and Disclosure of the Environmental Condition of Property (ECP) for Non-BRAC Real Estate Actions	Policy	DON	5-Jul-2006	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er-pdfs/gpr/don-ev-pol-memo-06-06-nonbrac-rlestate-20060705.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er-pdfs/gpr/don-ev-pol-memo-06-06-nonbrac-rlestate-20060705.pdf</a>
Recordkeeping	15	Environmental Restoration Program Implementation of the Naval Installation Restoration Information Solution (NIRIS)	Instruction	NAVFAC	NAVFAC Instruction 4715.1 11 Apr 2008	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er-pdfs/gpr/navfac-ev-inst4715.1-niris-20080411.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er-pdfs/gpr/navfac-ev-inst4715.1-niris-20080411.pdf</a>
	15	Final Guidance on Administrative Records for Selecting CERCLA Response Actions	Guidance	EPA	OSWER Directive 9833.3A-1 13 Dec 1990	<a href="http://nepis.epa.gov/Exe/ZyNET.exe/91010JDQ.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1986+Thru+1990&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5Cindex%20Data%5C86thru90%5CTxt%5C00000026%5C91010JDQ.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyDegree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425&amp;Display=p%7Cf&amp;DefSeekPage=x&amp;SearchBack=ZyActionL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;MaximumPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURL">http://nepis.epa.gov/Exe/ZyNET.exe/91010JDQ.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1986+Thru+1990&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5Cindex%20Data%5C86thru90%5CTxt%5C00000026%5C91010JDQ.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyDegree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425&amp;Display=p%7Cf&amp;DefSeekPage=x&amp;SearchBack=ZyActionL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;MaximumPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURL</a>
	15	NAVFAC Environmental Restoration Program Recordkeeping Manual	Manual	NAVFAC	1 Feb 2017	<a href="https://www.navfac.navy.mil/products_and_services/env_restoration/RKM.html">https://www.navfac.navy.mil/products_and_services/env_restoration/RKM.html</a>
	15	Policy for BRAC Program Implementation of the Naval Installation Restoration Information Solution	Policy	NAVFAC	5090 BPMD 08/05 19 May 2008	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er-pdfs/gpr/bpmd-ev-pol-niris-20080519.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er-pdfs/gpr/bpmd-ev-pol-niris-20080519.pdf</a>
	15	Revised Guidance on Compiling Administrative Records for CERCLA Response Actions	Guidance	EPA	20 Sep 2010	<a href="http://www.clu-in.org/conf/tio/CECOSC4_121813/AR-Guidance-dated-9.20.2010.pdf">http://www.clu-in.org/conf/tio/CECOSC4_121813/AR-Guidance-dated-9.20.2010.pdf</a>
	15	Revision To Increase Public Availability of the Administrative Record	Law	US CONGRESS	National Contingency Plan (NCP) 40 CFR 300.805(c) 18 Mar 2013	<a href="https://www.gpo.gov/fdsys/pkg/FR-2013-03-18/html/2013-06189.htm">https://www.gpo.gov/fdsys/pkg/FR-2013-03-18/html/2013-06189.htm</a>

**Table A-1 Environmental Restoration References (Continued)**

Subject	DON ERP Manual Chapter #	Document Name	Type	Issued by	Reference	Web Address
Remedial Design/Remedial Action	10	Remedial Design/Remedial Action Handbook	Handbook	EPA	EPA 540/R-95/059 Jun 1995	<a href="https://nepis.epa.gov/Exe/ZyNET.exe/100025CQ.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1995+Thru+1999&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5CInd ex%20Data%5C95thru99%5CTxt%5C00000000%5C1000 25CQ.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyDe gree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425 &amp;Display=hpfr&amp;DefSeekPage=x&amp;SearchBack=ZyActionL &amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;Maximu mPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURL">https://nepis.epa.gov/Exe/ZyNET.exe/100025CQ.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1995+Thru+1999&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5CInd ex%20Data%5C95thru99%5CTxt%5C00000000%5C1000 25CQ.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyDe gree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425 &amp;Display=hpfr&amp;DefSeekPage=x&amp;SearchBack=ZyActionL &amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;Maximu mPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURL</a>
Remedy Selection	8	Rules of Thumb for Superfund Remedy Selection	Guidance	EPA	OSWER Directive 9355.0-69 Aug 1997	<a href="https://semspub.epa.gov/work/HQ/174931.pdf">https://semspub.epa.gov/work/HQ/174931.pdf</a>
	8	The Role of Cost in the Superfund Remedy Selection Process	Guidance	EPA	EPA 540/F-96/018 Sep 1996	<a href="http://semspub.epa.gov/work/11/174446.pdf">http://semspub.epa.gov/work/11/174446.pdf</a>
RI/FS	8	DNAPL Remediation: Selected Projects Where Regulatory Closure Goals Have Been Achieved	Report	EPA	EPA 542/R-09/008 Aug 2009	<a href="https://clu-in.org/download/remed/542r09008.pdf">https://clu-in.org/download/remed/542r09008.pdf</a>
	8,13	Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA	Guidance	EPA	EPA/540/G-89/004 Oct 1988	<a href="https://semspub.epa.gov/work/HQ/174075.pdf">https://semspub.epa.gov/work/HQ/174075.pdf</a>
	8	Integrating Green and Sustainable Remediation Metrics within the CERCLA Process during the Feasibility Study	Guidance	DON	Jul 2012	<a href="http://www.navfac.navy.mil/content/dam/navfac/Speci alty%20Centers/Engineering%20and%20Expeditionary %20Warfare%20Center/Environmental/Restoration/er pdfs/g/navfacesc-ev-rpt-gsr-cercla-integrate-201207.pd f">http://www.navfac.navy.mil/content/dam/navfac/Speci alty%20Centers/Engineering%20and%20Expeditionary %20Warfare%20Center/Environmental/Restoration/er pdfs/g/navfacesc-ev-rpt-gsr-cercla-integrate-201207.pd f</a>
	8	Use of Alternate Concentration Limits in Superfund Cleanups	Policy	EPA	OSWER Directive 9200.4-39 19 Jul 2005	<a href="https://nepis.epa.gov/Exe/ZyPDF.cgi/P100KM6E.PDF?D ockey=P100KM6E.PDF">https://nepis.epa.gov/Exe/ZyPDF.cgi/P100KM6E.PDF?D ockey=P100KM6E.PDF</a>
	8, 19	Using Remediation Risk Management to Address Groundwater Cleanup Challenges at Complex Sites	Guidance	ITRC	January 2012	<a href="http://www.itrcweb.org/GuidanceDocuments/RRM2.p df">http://www.itrcweb.org/GuidanceDocuments/RRM2.p df</a>
Risk Assessment	8	Ecological Risk Assessment and Risk Management Principles for Superfund Sites	Guidance	EPA	OSWER Directive 9285.7-28P 7 Oct 1999	<a href="http://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=9100L92P. PDF">http://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=9100L92P. PDF</a>

**Table A-1 Environmental Restoration References (Continued)**

Subject	DON ERP Manual Chapter #	Document Name	Type	Issued by	Reference	Web Address
Risk Assessment (continued)	8	Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments	Guidance	EPA	EPA/540/R-97/006 Jun 1997	<a href="http://semspub.epa.gov/work/11/157941.pdf">http://semspub.epa.gov/work/11/157941.pdf</a>
	8	EPA Ecological Soil Screening Level Guidance and Documents	Guidance	EPA		<a href="http://www2.epa.gov/risk/ecological-soil-screening-level-eco-ssl-guidance-and-documents">http://www2.epa.gov/risk/ecological-soil-screening-level-eco-ssl-guidance-and-documents</a>
	8	EPA National Recommended Water Quality Criteria - Aquatic Life Criteria Table	Guidance	EPA		<a href="https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table">https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table</a>
	8	Guidelines for Ecological Risk Assessment	Guidance	EPA	EPA/630/R-95/002F Apr 1998	<a href="http://www.epa.gov/sites/production/files/2014-11/documents/eco_risk_assessment1998.pdf">http://www.epa.gov/sites/production/files/2014-11/documents/eco_risk_assessment1998.pdf</a>
	8	Navy Human Health Risk Assessment Guidance	Guidance	NAVFAC	1-Dec-2008	<a href="http://www.med.navy.mil/sites/nmcphc/Documents/environmental-programs/risk-assessment/Chapters_1-12.pdf">http://www.med.navy.mil/sites/nmcphc/Documents/environmental-programs/risk-assessment/Chapters_1-12.pdf</a>
	8	Navy Policy for Conducting Ecological Risk Assessments	Policy	CNO	Ser N453E/9U595355 5 Apr 1999	<a href="http://www.navfac.navy.mil/content/dam/navfac/Speci%20al%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/cno-ev-pol-era-19990405.pdf">http://www.navfac.navy.mil/content/dam/navfac/Speci%20al%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/cno-ev-pol-era-19990405.pdf</a>
	8	Navy Policy for Conducting Human Health Risk Assessments Under the Environmental Restoration Program	Policy	CNO	CNO SerN453E/10595168 12 Feb 2001	<a href="http://www.navfac.navy.mil/content/dam/navfac/Speci%20al%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/cno-ev-pol-hhra-20010212.pdf">http://www.navfac.navy.mil/content/dam/navfac/Speci%20al%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/cno-ev-pol-hhra-20010212.pdf</a>
	8	Regional Screening Level (RSL) Table	Guidance	EPA		<a href="http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm">http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm</a>
	8	Risk Assessment Guidance for Superfund	Guidance	EPA		<a href="https://www.epa.gov/risk/risk-assessment-guidance-superfund-rags-part">https://www.epa.gov/risk/risk-assessment-guidance-superfund-rags-part</a>
	8	Risk Assessment Guidance for Superfund (RAGS): Volume I - Human Health Evaluation Manual	Guidance	EPA	EPA/540/R-92/004 Publication 9285.7-01 Dec 1991	<a href="https://rais.ornl.gov/documents/HHEMC.pdf">https://rais.ornl.gov/documents/HHEMC.pdf</a>

**Table A-1 Environmental Restoration References (Continued)**

Subject	DON ERP Manual Chapter #	Document Name	Type	Issued by	Reference	Web Address
Risk Assessment (continued)	8	Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions	Directive	EPA	OSWER Directive 9355.0- 30 22 Apr 1991	<a href="https://nepis.epa.gov/Exe/ZyNET.exe/910165CR.txt?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1991%20Thru%201994&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;UseQField=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5CZYFILES%5CINDEX%20DATA%5C91THRU94%5CXT%5C00000028%5C910165CR.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyDegree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425&amp;Display=hpfr&amp;DefSeekPage=x&amp;SearchBack=ZyActionL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;MaximumPages=1&amp;ZyEntry=3">https://nepis.epa.gov/Exe/ZyNET.exe/910165CR.txt?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1991%20Thru%201994&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;UseQField=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5CZYFILES%5CINDEX%20DATA%5C91THRU94%5CXT%5C00000028%5C910165CR.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyDegree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425&amp;Display=hpfr&amp;DefSeekPage=x&amp;SearchBack=ZyActionL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;MaximumPages=1&amp;ZyEntry=3</a>
ROD	9	A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents	Guidance	EPA	EPA/540/R-98/031 Jul 1999	<a href="http://nepis.epa.gov/Exe/ZyNET.exe/10002BC6.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1995+Thru+1999&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5CIndex%20Data%5C95thru99%5CXT%5C00000011%5C10002BC6.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyDegree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425&amp;Display=p%7Cf&amp;DefSeekPage=x&amp;SearchBack=ZyActionL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;MaximumPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURL">http://nepis.epa.gov/Exe/ZyNET.exe/10002BC6.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1995+Thru+1999&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5CIndex%20Data%5C95thru99%5CXT%5C00000011%5C10002BC6.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyDegree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425&amp;Display=p%7Cf&amp;DefSeekPage=x&amp;SearchBack=ZyActionL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;MaximumPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURL</a>
	9	Toolkit for Preparing CERCLA Records of Decision	Toolkit	EPA	OSWER 9355.6-10 Sep 2011	<a href="http://www2.epa.gov/sites/production/files/document/s/irodtoolkit092011.pdf">http://www2.epa.gov/sites/production/files/document/s/irodtoolkit092011.pdf</a>
Sampling	19	Field Sampling and Analysis Technologies Matrix	Guidance	FRTR	1 Mar 1998	<a href="http://www.frtr.gov/site/samplematrix.html">http://www.frtr.gov/site/samplematrix.html</a>
	8	Naval Facilities Engineering Command (NAVFAC) Tiered Approach for Developing Sampling and Analysis Plans	Guidance	NAVFAC	5090 Ser 11007/EV3KPB 3 Jun 2011	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/navfac-ev-ltr-tieredsap-20110603.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/navfac-ev-ltr-tieredsap-20110603.pdf</a>
	8	SAP Tier 1 Template	Template	NAVFAC	1 Feb 2011	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/u/navfac-ev-tmpl-ufpsap-tier1-201102.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/u/navfac-ev-tmpl-ufpsap-tier1-201102.pdf</a>

**Table A-1 Environmental Restoration References (Continued)**

Subject	DON ERP Manual Chapter #	Document Name	Type	Issued by	Reference	Web Address
Sampling (continued)	8	SAP Tier 2 Template	Template	NAVFAC	15 Feb 2011	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/u/navfac-ev-tmpl-ufpsap-tier2-201102.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/u/navfac-ev-tmpl-ufpsap-tier2-201102.pdf</a>
SARA	1,15	Superfund Amendments and Reauthorization Act (SARA) of 1986	Law	US CONGRESS	1986	<a href="http://uscode.house.gov/statutes/pl/99/499.pdf">http://uscode.house.gov/statutes/pl/99/499.pdf</a>
Sediments	13, 14	Installation Restoration Policy on Sediment Investigation and Response Action	Policy	CNO	Ser 453E/2U589601 08 Feb 2002	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/don-ev-pol-sedsiteaction-20020208.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/don-ev-pol-sedsiteaction-20020208.pdf</a>
	13	Contaminated Sediments at Navy Facilities: Cleanup Alternatives TechData Sheet	TechData Sheet	NAVFAC	TDS-2092-ENV Dec 2002	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/c/navfac-ev-tds-2092-env-contseds-200212.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/c/navfac-ev-tds-2092-env-contseds-200212.pdf</a>
	13	Implementation Guide for Assessing and Managing Contaminated Sediment at Navy Facilities	Guidance	NAVFAC	UG-2053-ENV 1 Jan 2005	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/navfacesc-ev-ug-2053-sed-200501r2.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/navfacesc-ev-ug-2053-sed-200501r2.pdf</a>
	13	User's Guide for Assessing Sediment Transport at Navy Facilities	Guidance	SPAWAR	Technical Report 1960 Sep 2007	<a href="https://semspub.epa.gov/work/HQ/175408.pdf">https://semspub.epa.gov/work/HQ/175408.pdf</a>
	13	User's Guide for Determining the Sources of Contaminants in Sediments	Guidance	SPAWAR	Technical Report 1907 Sep 2003	<a href="https://clu-in.org/download/contaminantfocus/sediments/users-guide-determine-sources.pdf">https://clu-in.org/download/contaminantfocus/sediments/users-guide-determine-sources.pdf</a>
	13	Watershed Contaminated Source Document (WCSD) Fact Sheet	Fact Sheet	CNO	CNO-N45 Mar 2003	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/w/cno-ev-fs-wcsd-200303.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/w/cno-ev-fs-wcsd-200303.pdf</a>
Site Closeout	5,6,7,10,11	Guidance to Documenting Milestones throughout the Site Closeout Process	Guidance	NAVFAC	UG-2072-ENV Mar 2006	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/navfacesc-ev-ug-2072-env-sco-200603.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/navfacesc-ev-ug-2072-env-sco-200603.pdf</a>
	10	Joint Guidance on Streamlined Site Closeout and NPL Deletion Process For DoD Facilities	Guidance	DoD/EPA	19 Jan 2006	<a href="http://www.denix.osd.mil/references/dod/policy-guidance/dod-and-epa-joint-guidance/">http://www.denix.osd.mil/references/dod/policy-guidance/dod-and-epa-joint-guidance/</a>



**Table A-1 Environmental Restoration References (Continued)**

Subject	DON ERP Manual Chapter #	Document Name	Type	Issued by	Reference	Web Address
Superfund	1,2,11,13, 14,15	Executive Order 12580 Superfund Implementation	EO	WHITE HOUSE	52 FR 2923, 3 CFR, 1987 Comp., p. 193 23 Jan 1987	<a href="http://www.archives.gov/federal-register/codification/executive-order/12580.html">http://www.archives.gov/federal-register/codification/executive-order/12580.html</a>
	1	Executive Order 13016 Amendment to Executive Order 12580 Concerning Exercise of Authority under CERCLA Section 106	EO	WHITE HOUSE	61 FR 45871 30 Aug 1996	<a href="http://www.gpo.gov/fdsys/pkg/FR-1996-08-30/pdf/96-22462.pdf">http://www.gpo.gov/fdsys/pkg/FR-1996-08-30/pdf/96-22462.pdf</a>
	7,8	CERCLA/Superfund Orientation Manual	Manual	EPA	EPA/542/R-92/005 Oct 1992	<a href="http://nepis.epa.gov/Exe/ZyNET.exe/10002WV5.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1991+Thru+1994&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5Cindex%20Data%5C91thru94%5CTxt%5C00000003%5C10002WV5.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyDegree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425&amp;Display=p%7Cf&amp;DefSeekPage=x&amp;SearchBack=ZyActionL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;MaximumPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURL">http://nepis.epa.gov/Exe/ZyNET.exe/10002WV5.TXT?ZyActionD=ZyDocument&amp;Client=EPA&amp;Index=1991+Thru+1994&amp;Docs=&amp;Query=&amp;Time=&amp;EndTime=&amp;SearchMethod=1&amp;TocRestrict=n&amp;Toc=&amp;TocEntry=&amp;QField=&amp;QFieldYear=&amp;QFieldMonth=&amp;QFieldDay=&amp;IntQFieldOp=0&amp;ExtQFieldOp=0&amp;XmlQuery=&amp;File=D%3A%5Czyfiles%5Cindex%20Data%5C91thru94%5CTxt%5C00000003%5C10002WV5.txt&amp;User=ANONYMOUS&amp;Password=anonymous&amp;SortMethod=h%7C-&amp;MaximumDocuments=1&amp;FuzzyDegree=0&amp;ImageQuality=r75g8/r75g8/x150y150g16/i425&amp;Display=p%7Cf&amp;DefSeekPage=x&amp;SearchBack=ZyActionL&amp;Back=ZyActionS&amp;BackDesc=Results%20page&amp;MaximumPages=1&amp;ZyEntry=1&amp;SeekPage=x&amp;ZyPURL</a>
Vapor Intrusion	13	CSM Checklist	Checklist	NAVFAC		<a href="http://www.navfac.navy.mil/content/dam/navfac/Speci alty%20Centers/Engineering%20and%20Expeditionary %20Warfare%20Center/Environmental/Restoration/er_pdfs/c/navfacesc-ev-cklst-csm-vi-20121017.pdf">http://www.navfac.navy.mil/content/dam/navfac/Speci alty%20Centers/Engineering%20and%20Expeditionary %20Warfare%20Center/Environmental/Restoration/er_pdfs/c/navfacesc-ev-cklst-csm-vi-20121017.pdf</a>
	13	Navy/Marine Corps Policy on Vapor Intrusion	Policy	DON	1 Apr 2008	<a href="http://www.navfac.navy.mil/content/dam/navfac/Speci alty%20Centers/Engineering%20and%20Expeditionary %20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/nmc-ev-pol-vi-20080429.pdf">http://www.navfac.navy.mil/content/dam/navfac/Speci alty%20Centers/Engineering%20and%20Expeditionary %20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/nmc-ev-pol-vi-20080429.pdf</a>
	13	Guidance for Communicating Vapor Intrusion at Environmental Restoration Sites	Guidance	NAVFAC NMCPHC	Oct 2014	<a href="http://www.navfac.navy.mil/content/dam/navfac/Speci alty%20Centers/Engineering%20and%20Expeditionary %20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/navfac-ev-guid-vi-comms-20141009f.pdf">http://www.navfac.navy.mil/content/dam/navfac/Speci alty%20Centers/Engineering%20and%20Expeditionary %20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/navfac-ev-guid-vi-comms-20141009f.pdf</a>

**Table A-1 Environmental Restoration References (Continued)**

Subject	DON ERP Manual Chapter #	Document Name	Type	Issued by	Reference	Web Address
Vapor Intrusion (continued)	13	Quantitative Decision Framework for Assessing Navy Vapor Intrusion Sites	Decision Framework	NESDI	Jun 2015	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/v/navfacexwc-ev-TR-frmwk-vi-201506.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/v/navfacexwc-ev-TR-frmwk-vi-201506.pdf</a>
	13	Technical Guide for Addressing Petroleum Vapor Intrusion at Leaking Underground Storage Tank Sites	Guidance	EPA	EPA 510-R-15-001 Jun 2015	<a href="https://www.epa.gov/sites/production/files/2015-06/documents/pvi-guide-final-6-10-15.pdf">https://www.epa.gov/sites/production/files/2015-06/documents/pvi-guide-final-6-10-15.pdf</a>
	13	Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air	Guidance	EPA	OSWER 9200.2-154 Jun 2015	<a href="https://www.epa.gov/sites/production/files/2015-09/documents/oswer-vapor-intrusion-technical-guide-final.pdf">https://www.epa.gov/sites/production/files/2015-09/documents/oswer-vapor-intrusion-technical-guide-final.pdf</a>
	8,13	Vapor Intrusion Handbook	Handbook	DoD	Jan 2009	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/dod-ev-hdbk-vi-200901.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/gpr/dod-ev-hdbk-vi-200901.pdf</a>
	13	Vapor Intrusion Mitigation in Existing Buildings Fact Sheet	Fact Sheet	NAVFAC	1 May 2011	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/v/navfac-ev-fs-vi-mit-existbldgs-201105.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/v/navfac-ev-fs-vi-mit-existbldgs-201105.pdf</a>
	13	Vapor Intrusion Mitigation in Construction of New Buildings Fact Sheet	Fact Sheet	NAVFAC	1 Aug 2011	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/v/navfac-ev-fs-vi-mit-newbldg-201108.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specalty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/erpdfs/v/navfac-ev-fs-vi-mit-newbldg-201108.pdf</a>
	13,19	Vapor Intrusion Pathway: A Practical Guideline	Guidance	ITRC	1 Jan 2007	<a href="http://www.itrcweb.org/documents/vi-1.pdf">http://www.itrcweb.org/documents/vi-1.pdf</a>

**Table A-2 Environmental Restoration Websites**

Internet (Public)		
AFCEC	Air Force Civil Engineer Center	<a href="http://www.afcec.af.mil/">http://www.afcec.af.mil/</a>
ASTDR	Agency for Toxic Substances & Disease Registry	<a href="http://www.atsdr.cdc.gov/">http://www.atsdr.cdc.gov/</a>
ASTM	American Society for Testing and Materials	<a href="http://www.astm.org/">http://www.astm.org/</a>
BRAC PMO	NAVFAC Base Realignment and Closure (BRAC) Program Management Office	<a href="http://www.bracpmo.navy.mil/">http://www.bracpmo.navy.mil/</a>
CECOS	Naval Civil Engineer Corps Officers School	<a href="https://www.netc.navy.mil/centers/csfe/cecos/">https://www.netc.navy.mil/centers/csfe/cecos/</a>
CNO	Chief of Naval Operations	<a href="http://www.navy.mil/cno/">http://www.navy.mil/cno/</a>
DENIX	DoD Environmental, Safety and Occupational Health Network and Information Exchange	<a href="http://www.denix.osd.mil/">http://www.denix.osd.mil/</a>
DoD	U. S. Department of Defense	<a href="http://www.defense.gov/">http://www.defense.gov/</a>
DSMOA	Defense & State Memorandum of Agreement Community Portal	<a href="https://dsmoa.usace.army.mil/dsmoa_production/Security/tabid/63/Default.aspx?returnurl=%2fDSMOA_Production%2fDefault.aspx">https://dsmoa.usace.army.mil/dsmoa_production/Security/tabid/63/Default.aspx?returnurl=%2fDSMOA_Production%2fDefault.aspx</a>
EDQW	Environmental Data Quality Workgroup	<a href="http://www.denix.osd.mil/edqw/">http://www.denix.osd.mil/edqw/</a>
EPA	Environmental Protection Agency	<a href="http://www.epa.gov/">http://www.epa.gov/</a>
ERB	NAVFAC Environmental Restoration and BRAC	<a href="http://www.navfac.navy.mil/go/erb">http://www.navfac.navy.mil/go/erb</a>
ESTCP	Environmental Security Technology Certification Program	<a href="http://www.serdp.org/">http://www.serdp.org/</a>
FRTR	Federal Remediation Technologies Roundtable	<a href="http://www.frtr.gov/">http://www.frtr.gov/</a>
GPO	Government Printing Office (Code of Federal Regulations)	<a href="http://www.gpo.gov/">http://www.gpo.gov/</a>
ITRC	Interstate Technology & Regulatory Council	<a href="http://www.itrcweb.org/">http://www.itrcweb.org/</a>
NAVFAC	Naval Facilities Engineering Command	<a href="http://www.navfac.navy.mil/">http://www.navfac.navy.mil/</a>
NAVSEA	Naval Sea Systems Command	<a href="http://www.navsea.navy.mil/default.aspx">http://www.navsea.navy.mil/default.aspx</a>
NESDI	Navy Environmental Sustainability Development to Integration Program	<a href="http://greenfleet.dodlive.mil/environment/nesdi/">http://greenfleet.dodlive.mil/environment/nesdi/</a>
NMCPHC	Navy and Marine Corps Public Health Center	<a href="http://www.nmcphc.med.navy.mil/">http://www.nmcphc.med.navy.mil/</a>
NOSSA	Naval Ordnance Safety and Security Activity	<a href="http://www.navsea.navy.mil/Home/NOSSA.aspx">http://www.navsea.navy.mil/Home/NOSSA.aspx</a>
OMB	Office of Management and Budget	<a href="http://www.whitehouse.gov/omb">http://www.whitehouse.gov/omb</a>
OSHA	Occupational Safety and Health Administration	<a href="https://www.osha.gov/">https://www.osha.gov/</a>
SERDP	Strategic Environmental Research and Development Program	<a href="http://www.serdp.org/">http://www.serdp.org/</a>
Triad	Triad Resource Center	<a href="http://www.triadcentral.org/">http://www.triadcentral.org/</a>
USACE	U.S. Army Corps of Engineers	<a href="http://www.usace.army.mil/">http://www.usace.army.mil/</a>
USGS	U.S. Geological Survey	<a href="http://www.usgs.gov/">http://www.usgs.gov/</a>

**Table A-2 Environmental Restoration Websites (Continued)**

<b>Intranet (Private)</b> <b>Requires Common Access Card or Registration/Account</b>		
DAU	Defense Acquisition University	<a href="https://www.dau.mil/">https://www.dau.mil/</a>
NAVFAC BMS	NAVFAC Business Management System	<a href="https://hub.navfac.navy.mil/webcenter/portal/bms/BMS+Home+Page?_afLoop=498612900972751">https://hub.navfac.navy.mil/webcenter/portal/bms/BMS+Home+Page?_afLoop=498612900972751</a>
NAVFAC ERB Secure	NAVFAC Environmental Restoration and BRAC Secure	<a href="https://hub.navfac.navy.mil/webcenter/portal/exwc/Business_-_Program_Lines/page142/page190">https://hub.navfac.navy.mil/webcenter/portal/exwc/Business_-_Program_Lines/page142/page190</a>
NESDI	Navy Environmental Sustainability Development to Integration Program	<a href="http://greenfleet.dodlive.mil/environment/nesdi/">http://greenfleet.dodlive.mil/environment/nesdi/</a>
NIRIS	Naval Installation Restoration Information Solution	<a href="https://niris.navfac.navy.mil/se/nirisportal/">https://niris.navfac.navy.mil/se/nirisportal/</a>

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## Appendix B – Types of Installations and Operations that Generated G-RAM Contamination

General Radioactive Material (G-RAM) Operations	Types of Installation that Conducted G-RAM Operations / Operational Use	Facilities, Areas, or Shops within Installations Performing G-RAM Operations or Material Produced from G-RAM Operations
Use, Handling, and Refurbishment of Radioluminescent Devices (Dials, Gauges, and Markers)	Installation or organization that provided repair and maintenance of ships, aircraft, and vehicles	Aircraft Hangars Aircraft Instrument Shops Aircraft Maintenance Hanger Electronics/Electrical Shops Gauge Shops Instrument Shops Machine Shops Machinery and Electrical Test/Repair Shops Optical Shops Radium Dial Painting Facilities Radium Refurbishing Shops Ship Maintenance Facilities Gyrocompass Shops Vehicle Maintenance Facilities Paraloft or Parachute Facilities
	Installation or organization that reuses, transfers, donates, sells, or disposes of excess/surplus property	Defense Reutilization and Marketing Office Salvage Yard Scrap Yard
	Installation or organization that collects or displays DON artifacts	Navy and Marine Corps Museums
Disposal of Radioluminescent Devices (Dials, Gauges, and Markers)	Installation or organization that provided repair and maintenance of ships, aircraft, and vehicles	All areas/sites where debris disposal has occurred prior to 1980: Burn Pits Disposal Areas/Sites Dump Sites Hazardous Waste Accumulation Area Industrial Waste Water Treatment Plants Landfills Low-level Radioactive Waste Processing, Turn-in or Storage Facilities Mole Piers Radium Paint Shops (Plumbing)

General Radioactive Material (G-RAM) Operations	Types of Installation that Conducted G-RAM Operations / Operational Use	Facilities, Areas, or Shops within Installations Performing G-RAM Operations or Material Produced from G-RAM Operations
		Salvage Yards Sanitary Sewer Systems Scrap Yards Solid Waste Disposal Areas Solid Waste Management Units Storm Drain Systems including Outfalls Trash Disposal Sites Waste/Disposal Pits
Dredging	Installations that conducted dredging operations around the piers	Any area that received dredge spoils: Dredge Ponds Dredge Outfalls Disposal Sites Fill areas
Aircraft Maintenance Facilities	Installations that perform aircraft maintenance: Organizational (O-Level), Intermediate (I-Level) and Depot (D-Level) maintenance	Fleet Readiness Centers Naval Air Facility Naval Aviation Depot Aircraft Intermediate Maintenance Depot Marine Aviation Logistics Squadron Aircraft Squadrons (Maintenance Depts/Div) Helicopter Squadrons (Maintenance Depts/Div)
Ship Maintenance Facilities	Installations that maintained and moored ships	Ships' Berths and Piers Dry Docks Mole Piers Ship Maintenance Support Facilities Inactive Ship Facilities
Smelting (Slag generated from smelting operations)	Installations that operated a smelter	Smelters Foundries Any area that received slag: Slag Piles Disposal Sites Fill Areas Built-up Shorelines

<b>General Radioactive Material (G-RAM) Operations</b>	<b>Types of Installation that Conducted G-RAM Operations / Operational Use</b>	<b>Facilities, Areas, or Shops within Installations Performing G-RAM Operations or Material Produced from G-RAM Operations</b>
Incineration	Installations that had incinerators or burned trash	Furnace Incinerator Kiln Fireboxes Forge Shops Firebrick or Refractory Brick Disposal Sites
Open Burning	Most all installations	Burn Pits Disposal Sites
Research	Installations that conducted naval research	Rooms & Laboratories Particle Accelerators Neutron Generators Depleted Uranium Munitions Testing Above and Below Ground Waste Storage Tanks Waste Storage Areas Radioactive Material Storage Areas
Industrial Waste Water or Sewer Treatment Process	Some major installations	Wastewater or Sewer Treatment Plant/Facility Sludge
Depleted Uranium Use/Storage/Testing	Air stations and research installations	Aircraft Components Aircraft Counterweights Munitions Storage Aircraft Maintenance Facilities
Welding Rod Grinding Facilities	Installations that conduct repair and maintenance operations	Welding Facilities – Thoriated Tungsten Welding Rods
Fill Areas	Most installations	Shoreline Expansion Areas Mole Pier
Target/Bombing Range	Installations that conducted target or bombing operations	Depleted Uranium Test Ranges Radioluminescent Dials and Gauges from Targets Magnesium-Thorium from Targets
Scale	Many Installations	Drydock Pump House and Discharge Channel Waste Water Treatment Plant Sewer Treatment Plant



<b>General Radioactive Material (G-RAM) Operations</b>	<b>Types of Installation that Conducted G-RAM Operations / Operational Use</b>	<b>Facilities, Areas, or Shops within Installations Performing G-RAM Operations or Material Produced from G-RAM Operations</b>
Storage of Radioactive Material	Installations that generate radioactive waste	Low Level Radioactive Waste Storage Area Radioactive Waste Storage Area Radioluminescent Device Turn-in Building Hazardous Materials Storage
Personnel and Equipment Decontamination	Many Installations	Personnel Decontamination Facility Radioactive Laundry Laboratories
Radiation Training	Installations that conduct radiation worker training	Radiation Training Facility Decontamination Training
Analyzing Radioactive Materials	Installations that conduct research or analyze environmental samples	Physics Counting Room Sampling Laboratory Analytical Laboratory Instrumentation Laboratory

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## Appendix C – Personal Protective Equipment Selection and Testing

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### C-1. Personal Protective Equipment (PPE) Selection

PPE programs and selection at Department of Navy (DON) Environmental Restoration Program (ERP) sites follow the same hazard assessment (HA) guidelines as those used at any other industrial or construction worksites, as specified in 29 Code of Federal Regulations (CFR) Part 1910.132 and Section 05 of Engineering Manual (EM) 385-1-97 (current edition). The HA for the selection of the proper PPE involves the following steps:

1. Identifying the site-specific hazards;
2. Assessing the hazards and any known or potential level of exposure;
3. Determining if the hazards can be eliminated or controlled (by engineering design or administrative methods) to an acceptable level to negate the use of PPE, and, if not;
4. Selecting the PPE that will properly protect the employee from the hazards identified in the HA. The PPE decision should be clearly communicated to affected employees and properly fit them; and
5. Properly documenting the HA and verifying that the HA is complete.

PPE programs and selection of PPE for ERP sites should be in accordance with the requirements of 29 CFR Part 1910.120, 29 CFR Part 1926.65 and Section 28 of EM 385-1-1 (current edition). Hazard-specific PPE requirements may be required based on the HA. For example, if respiratory protection is used, selection and use must follow the requirements of 29 CFR Part 1910.134. If noise hazards exist, 29 CFR Part 1910.95 and 29 CFR Part 1926.52 are applicable for the noise assessment and selection, fitting, and use of hearing protection.

For ERP (HAZWOPER-applicable) sites, Appendix B of 29 CFR Part 1910.120 and 29 CFR Part 1926.65 provides four levels of PPE based on the severity of the site hazard(s) and the matching degree of protection afforded. The levels listed do not address the performance of specific PPE material for a specific hazard (either physical or chemical). The level requirements for PPE provide a guide to assist the employer with the selection of the proper site-specific PPE. A summary of the four levels of PPE are provided in Table C-1. For specific information about each level of PPE, when that level should be selected, and when that level should be used, please consult OSHA guidelines in Appendix B of 29 CFR Part 1910.120 and 29 CFR Part 1926.65.

**Table C-1 Levels of Personal Protective Equipment**

**LEVEL A - To be selected when the greatest level of skin, respiratory, and eye protection is required**

1. Positive pressure, full face-piece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA, approved by the National Institute for Occupational Safety and Health (NIOSH)
2. Totally-encapsulating chemical-protective suit
3. Coveralls (Optional, as applicable)
4. Long underwear (Optional, as applicable)
5. Gloves, outer, chemical-resistant
6. Gloves, inner, chemical-resistant
7. Boots, chemical-resistant, steel toe and shank
8. Hard hat (under suit) ( Optional, as applicable)

**Table C-1 Levels of Personal Protective Equipment**

9. Disposable protective suit, gloves and boots (depending on suit construction, may be worn over totally-encapsulating suit)
<b>LEVEL B - The highest level of respiratory protection is necessary but a lesser level of skin protection is needed</b> <ol style="list-style-type: none"> <li>1. Positive pressure, full face-piece SCBA, or positive pressure supplied air respirator with escape SCBA (NIOSH approved)</li> <li>2. Hooded chemical-resistant clothing (overalls and long-sleeved jacket; coveralls; one or two-piece chemical-splash suit; disposable chemical-resistant overalls)</li> <li>3. Coveralls (Optional, as applicable)</li> <li>4. Gloves, outer, chemical-resistant</li> <li>5. Gloves, inner, chemical-resistant</li> <li>6. Boots, outer, chemical-resistant steel toe and shank</li> <li>7. Boot-covers, outer, chemical-resistant (disposable) (Optional, as applicable)</li> <li>8. Hard hat (Optional, as applicable)</li> <li>9. Face shield (Optional, as applicable)</li> </ol>
<b>LEVEL C: - The concentration(s) and type(s) of airborne substance(s) is known and the criteria for using air purifying respirators are met. Not Acceptable for Chemical Emergency Response</b> <ol style="list-style-type: none"> <li>1. Full-face or half-mask, air purifying respirators (NIOSH approved)</li> <li>2. Hooded chemical-resistant clothing (overalls; two-piece chemical-splash suit; disposable chemical-resistant overalls)</li> <li>3. Coveralls (Optional, as applicable)</li> <li>4. Gloves, outer, chemical-resistant</li> <li>5. Gloves, inner, chemical-resistant</li> <li>6. Boots, outer, chemical-resistant steel toe and shank (Optional, as applicable)</li> <li>7. Boot-covers, outer, chemical-resistant (disposable) (Optional, as applicable)</li> <li>8. Hard hat (Optional, as applicable)</li> <li>9. Escape mask (Optional, as applicable)</li> <li>10. Face shield (Optional, as applicable)</li> </ol>
<b>LEVEL D: - A work uniform affording minimal protection: used for nuisance contamination only. Not Acceptable for Chemical Emergency Response</b> <ol style="list-style-type: none"> <li>1. Coveralls</li> <li>2. Gloves (Optional, as applicable)</li> <li>3. Boots/shoes, chemical-resistant steel toe and shank</li> <li>4. Boots, outer, chemical-resistant (disposable) (Optional, as applicable)</li> <li>5. Safety glasses or chemical splash goggles (Optional, as applicable)</li> <li>6. Hard hat (Optional, as applicable)</li> <li>7. Escape mask (Optional, as applicable)</li> <li>8. Face shield (Optional, as applicable)</li> </ol>
<b>Reference:</b> Appendix B, <a href="#">29 CFR Part 1910.120</a> and <a href="#">29 CFR Part 1926.65</a> .

PPE selection can be a complex process. The amount of protection provided by PPE is material-specific, and in most situations PPE materials may not be available that provide continuous protection. The following factors must be considered in the selection of PPE:

- Permeation;
- Degradation;
- Penetration;
- Heat transfer;
- Durability;
- Flexibility;
- Temperature effects;
- Ease of decontamination;
- Compatibility with other equipment; and
- Duration of use.

Heat stress is often a significant concern at project sites and prevention of heat related illness and injury must be a consideration in the project Accident Prevention Plan (APP)/Health and Safety Plan (HASP). Heat stress brought on through the use of PPE should be considered. The use of PPE decreases the body's ability to eliminate excess heat. It is imperative that the correct level of PPE necessary to prevent employee contact and exposure to hazardous conditions be selected, and care taken not to "over-protect" employees, potentially creating a heat stress situation.

## **C-2. Immediately Dangerous to Life and Health Situations**

Use either positive-pressure SCBA or positive-pressure airline respirators equipped with an escape air supply where conditions are identified as immediately dangerous to life and health (IDLH) or potentially IDLH. Use totally encapsulating chemical protective suits (Level A) protection, as defined in Appendix B of 29 CFR Part 1910.120 and 29 CFR Part 1926.65 in conditions where contact of the skin by the hazardous substances may result in an IDLH situation.

Alternatively, evacuate the work area until engineering controls can be implemented to mitigate the IDLH conditions, allowing workers to reenter the work zone under reduced PPE levels.

## **C-3. Testing and Fitting of Personal Protective Equipment**

Per 29 CFR Part 1910.132 and 29 CFR Part 1926 Subpart E, all PPE used must properly fit the employees that are required to wear it, and it must be inspected and properly maintained. Employees must be properly trained on the inspection and use of selected PPE, including how to properly adjust PPE as necessary. 29 CFR Part 1910.134 provides specific requirements for the fitting and fit testing of respirators. 29 CFR Part 1910.95 provides specific information on the fitting of hearing protection. Appendix A of 29 CFR Part 1910.120 and 29 CFR Part 1926.65 provide non-mandatory examples of tests that may be used to evaluate PPE compliance with required capabilities.

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## Appendix D – Remedial Technology Resources

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The primary Department of Navy (DON) Environmental Restoration Program (ERP) website describing remedial technologies is the [NAVFAC Environmental Restoration and Base Realignment and Closure \(BRAC\) Website \(ERB\)](#). It is intended to be a one-stop resource for both DON environmental professionals and community members interested or involved in environmental site cleanup. The ERB website may be searched using any Internet search engine. There are informative pages on various topics, including:

1. Technologies sorted by these categories:
  - Investigation and monitoring technologies
  - Remediation (cleanup) technologies
2. Optimization of technologies
3. Long term management of cleanup sites
4. Technology transfer (T2) Page for innovative technology
5. A-Z listing of environmental restoration (ER) publications
6. Workgroup pages
7. Guidance, policy, and regulations

There are numerous other online resources describing remedial technologies and there are various Internet search engines to search the vast amount of online information for specific technologies. Three online resources of special importance are described below.

1. [Federal Remediation Technologies Roundtable \(FRTR\)](#). Of particular note, the FRTR has:
  - Cost and Performance reports;
  - Case Studies; and a
  - Remediation Technologies Screening Matrix tool
2. Environmental Protection Agency (EPA) has a number of informative sites. EPA's Clu-In website <http://www.clu-in.org/remediation/> has an extensive listing of ER technologies including descriptions, guidance, and additional resources.
3. The Interstate Technology and Regulatory Council (ITRC) is a coalition of state environmental regulators working with federal partners, industry, and stakeholders to advance innovative environmental decision making. There are a number of training events and documents available at their website <http://www.itrcweb.org>.

A list of additional resources is provided in Table D-1.

**Table D-1 Additional Remedial Technology Resources**

Technology Overview	Naval Facilities Engineering Command (NAVFAC) Remediation Technologies List	<a href="http://www.navfac.navy.mil/navfac_worldwide/specialty_centers/exwc/products_and_services/ev/erb/tech.html">http://www.navfac.navy.mil/navfac_worldwide/specialty_centers/exwc/products_and_services/ev/erb/tech.html</a>
	Environmental Security Technology Certification Program (ESTCP) Dense Non-Aqueous Phase Liquid (DNAPL) Technology Evaluation Screening Tool	<a href="https://www.serdp-estcp.org/Program-Areas/Environmental-Restoration/Contaminated-Groundwater/Persistent-Contamination/ER-200424">https://www.serdp-estcp.org/Program-Areas/Environmental-Restoration/Contaminated-Groundwater/Persistent-Contamination/ER-200424</a>
	NAVFAC Light Non-Aqueous Phase Liquid (LNAPL) Site Management Handbook	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/l/navfac-ev-hdbk-lnapl-mgmt-20101130.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/l/navfac-ev-hdbk-lnapl-mgmt-20101130.pdf</a>
	ITRC Evaluating LNAPL Remedial Technologies for Achieving Project Goals	<a href="http://www.itrcweb.org/Documents/LNAPL-2.pdf">http://www.itrcweb.org/Documents/LNAPL-2.pdf</a>
	NAVFAC DNAPL Management Overview	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/d/navfac-ev-hdbk-dnapl-mgmt-ov-200704.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/d/navfac-ev-hdbk-dnapl-mgmt-ov-200704.pdf</a>
	ITRC Integrated DNAPL Site Strategy	<a href="http://www.itrcweb.org/Documents/IntegratedDNAPLStrategy_IDSSDoc/IDSS-1.pdf">http://www.itrcweb.org/Documents/IntegratedDNAPLStrategy_IDSSDoc/IDSS-1.pdf</a>
	ESTCP Environmental Restoration Demonstration Projects	<a href="https://www.serdp-estcp.org/Program-Areas/Environmental-Restoration">https://www.serdp-estcp.org/Program-Areas/Environmental-Restoration</a>
	FRTR Remediation Technologies Screening Matrix	<a href="http://www.frtr.gov/matrix2/top_page.html">http://www.frtr.gov/matrix2/top_page.html</a>
	EPA CLU-IN Remediation Technology Webpage	<a href="http://www.clu-in.org/remediation/">http://www.clu-in.org/remediation/</a>
	EPA Office of Superfund Remediation and Technology Innovation	<a href="http://www.epa.gov/superfund/partners/osrti/index.htm">http://www.epa.gov/superfund/partners/osrti/index.htm</a>

Table D-1 Additional Remedial Technology Resources		
Biological Treatment Guidance	NAVFAC Fact Sheet on Using Bioremediation in DNAPL Source Zones	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/b/navfac-ev-fs-biorem-dnapl-20120412.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/b/navfac-ev-fs-biorem-dnapl-20120412.pdf</a>
	ESTCP Principles and Practices of Enhanced Anaerobic Bioremediation of Chlorinated Solvents	<a href="http://www.serdp-estcp.org/content/download/4158/63396/file/ER-0125-PP-01-N.pdf">http://www.serdp-estcp.org/content/download/4158/63396/file/ER-0125-PP-01-N.pdf</a>
	ITRC Decision Framework for Applying Monitored Natural Attenuation Processes to Metals and Radionuclides in Groundwater	<a href="http://www.itrcweb.org/GuidanceDocuments/APMR1.pdf">http://www.itrcweb.org/GuidanceDocuments/APMR1.pdf</a>
	ITRC Phytotechnology Technical and Regulatory Guidance and Decision Trees, Revised	<a href="http://www.itrcweb.org/GuidanceDocuments/PHYTO-3.pdf">http://www.itrcweb.org/GuidanceDocuments/PHYTO-3.pdf</a>
Physical/Chemical Treatment Guidance	NAVFAC Fact Sheet on In Situ Chemical Oxidation	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/i/navfac-ev-fs-isco-20110914.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/i/navfac-ev-fs-isco-20110914.pdf</a>
	NAVFAC Best Practices for Injection and Distribution of Amendments	<a href="https://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/b/navfacexwc-ev-tr-1303-injectamnd-20130319.pdf">https://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/b/navfacexwc-ev-tr-1303-injectamnd-20130319.pdf</a>
	NAVFAC Design and Quality Assurance/Quality Control Considerations for In Situ Chemical Oxidation	<a href="https://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/d/navfacexwc-ev-tm-1302-isco-qaqc-201302.pdf">https://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/d/navfacexwc-ev-tm-1302-isco-qaqc-201302.pdf</a>
	ITRC Permeable Reactive Barrier: Technology Update	<a href="http://www.itrcweb.org/Documents/PRB-5-1.pdf">http://www.itrcweb.org/Documents/PRB-5-1.pdf</a>
Cost and Performance (C&P) Reports	FRTR Cost & Performance (C&P) Case Studies	<a href="http://www.frtr.gov/costperf.htm">http://www.frtr.gov/costperf.htm</a>
	NAVFAC C&P Reports (Permeable Reactive Barriers; Persulfate; ZVI; Electrical Resistance Heating)	<a href="https://www.navfac.navy.mil/navfac_worldwide/specialty_centers/exwc/products_and_services/ev/erb/pubs.html#C">https://www.navfac.navy.mil/navfac_worldwide/specialty_centers/exwc/products_and_services/ev/erb/pubs.html#C</a>



**Table D-1 Additional Remedial Technology Resources**

Green and Sustainable Remediation (GSR)	ERB Green and Sustainable Remediation (GSR) Webpage	<a href="http://www.navfac.navy.mil/navfac_worldwide/specialty_centers/exwc/products_and_services/ev/erb/gsr.html">http://www.navfac.navy.mil/navfac_worldwide/specialty_centers/exwc/products_and_services/ev/erb/gsr.html</a>
	DON Guidance on GSR	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdf/s/gpr/navfacesc-ev-ug-2093-env-gsr-20120405r1.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdf/s/gpr/navfacesc-ev-ug-2093-env-gsr-20120405r1.pdf</a>
	NAVFAC GSR Fact Sheet	<a href="https://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdf/s/g/navfac-ev-fs-gsr-201405v7.pdf">https://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdf/s/g/navfac-ev-fs-gsr-201405v7.pdf</a>
	SiteWise™ V.3.1 User's Guide	<a href="https://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdf/s/SiteWise3.1/sitewisetm_user_guide_Version%203%201_20150924.pdf">https://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdf/s/SiteWise3.1/sitewisetm_user_guide_Version%203%201_20150924.pdf</a>
	SiteWise™ V.3.1 Software. (ERB Secure on Optimization Workgroup page)	<a href="https://hub.navfac.navy.mil/webcenter/portal/exwc/Business+Lines/Environmental+Security/ERB-Environmental+Restoration+and+BRAC/WG-OPT?_afLoop=215204088436044#!%40%40%3F_afLoop%3D215204088436044%26centerWidth%3D100%2525%26lastReviewedDate%3D2%2BNovember%2B2014%26leftWidth%3D0%2525%26pocEmail%3Dbarbara.a.johnson1%2540navy.mil%26rightWidth%3D0%2525%26showFooter%3Dfalse%26showHeader%3Dfalse%26_adf.ctrl-state%3Dferaf79da_45">https://hub.navfac.navy.mil/webcenter/portal/exwc/Business+Lines/Environmental+Security/ERB-Environmental+Restoration+and+BRAC/WG-OPT?_afLoop=215204088436044#!%40%40%3F_afLoop%3D215204088436044%26centerWidth%3D100%2525%26lastReviewedDate%3D2%2BNovember%2B2014%26leftWidth%3D0%2525%26pocEmail%3Dbarbara.a.johnson1%2540navy.mil%26rightWidth%3D0%2525%26showFooter%3Dfalse%26showHeader%3Dfalse%26_adf.ctrl-state%3Dferaf79da_45</a>
	EPA Green Remediation Focus	<a href="http://www.clu-in.org/greenremediation/">http://www.clu-in.org/greenremediation/</a>
	ITRC Green and Sustainable Remediation: A Practical Framework	<a href="http://www.itrcweb.org/Documents/GSR-2.pdf">http://www.itrcweb.org/Documents/GSR-2.pdf</a>

**Table D-1 Additional Remedial Technology Resources**

Remedial Technology Optimization	ERB Optimization Webpage	<a href="https://www.navfac.navy.mil/navfac_worldwide/specialty_centers/exwc/products_and_services/ev/erb/opt.html">https://www.navfac.navy.mil/navfac_worldwide/specialty_centers/exwc/products_and_services/ev/erb/opt.html</a>
	Remedial Alternatives Analysis (RAA) Guidance	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/r/navfac-ev-guid-raa-20120404.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/r/navfac-ev-guid-raa-20120404.pdf</a>
	DON Guidance for Optimizing Remedy Evaluation, Selection, and Design	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/navfacesc-ev-ug-2087-env-opt-remedy-20100309.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/navfacesc-ev-ug-2087-env-opt-remedy-20100309.pdf</a>
	DON Guidance for Optimizing Remedial Action Operations (RA-O)	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/navfacexwc-ev-ug-1301-opt-rao-20121001.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/navfacexwc-ev-ug-1301-opt-rao-20121001.pdf</a>
	NAVFAC Management and Monitoring Approach (MMA) Presentation	<a href="http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/m/navfac-ev-pres-mma-20120503v2.pdf">http://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/m/navfac-ev-pres-mma-20120503v2.pdf</a>
	NAVFAC Transitioning from Conventional to Passive Sampling for Groundwater Fact Sheet	<a href="https://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/t/navfacexwc-ev-tds-1305-gw-passive-201304.pdf">https://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/t/navfacexwc-ev-tds-1305-gw-passive-201304.pdf</a>
	DON Guidance for Planning and Optimizing Monitoring Strategies	<a href="https://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/navfacesc-ev-ug-2081-env-opt-mon-201011r1.pdf">https://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/gpr/navfacesc-ev-ug-2081-env-opt-mon-201011r1.pdf</a>
Munitions Response	ERB Munitions Response Program (MRP) Webpage (ERB Secure) (policy, case studies, videos)	<a href="https://www.navfac.navy.mil/navfac_worldwide/specialty_centers/exwc/products_and_services/ev/erb/mr-sites.html">https://www.navfac.navy.mil/navfac_worldwide/specialty_centers/exwc/products_and_services/ev/erb/mr-sites.html</a>

Table D-1 Additional Remedial Technology Resources		
Vapor Intrusion	ERB Vapor Intrusion (VI) Webpage (policy, T2 Tool, Fact Sheets on mitigation and innovative site characterization)	<a href="https://www.navfac.navy.mil/navfac_worldwide/specialty_centers/exwc/products_and_services/ev/erb/vi.html">https://www.navfac.navy.mil/navfac_worldwide/specialty_centers/exwc/products_and_services/ev/erb/vi.html</a>
	VI Assessment Tool (Private) In Naval Installation Restoration Information Solution (NIRIS)	<a href="https://niris.navfac.navy.mil/se/nirisportal/">https://niris.navfac.navy.mil/se/nirisportal/</a>
Sediments	ERB Sediment Webpage	<a href="https://www.navfac.navy.mil/navfac_worldwide/specialty_centers/exwc/products_and_services/ev/erb/seds.html">https://www.navfac.navy.mil/navfac_worldwide/specialty_centers/exwc/products_and_services/ev/erb/seds.html</a>
	A Handbook for Determining the Sources of Polychlorinated Biphenyl (PCB) Contamination in Sediments	<a href="https://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/p/navfacexwc-ev-tr-1302-hdbk-pcb-seds-201210.pdf">https://www.navfac.navy.mil/content/dam/navfac/Specialty%20Centers/Engineering%20and%20Expeditionary%20Warfare%20Center/Environmental/Restoration/er_pdfs/p/navfacexwc-ev-tr-1302-hdbk-pcb-seds-201210.pdf</a>
Other Useful Sites	United States Geological Survey (USGS) Site Remediation	<a href="http://toxics.usgs.gov/topics/remediation.html">http://toxics.usgs.gov/topics/remediation.html</a>
	NAVFAC Natural Attenuation Software – This website provides a downloadable tool to evaluate natural attenuation.	<a href="http://www.nas.cee.vt.edu">http://www.nas.cee.vt.edu</a>
	EPA Monitored Natural Attenuation (MNA) Website – This website provides EPA and non-EPA MNA guidance documents, software and technical information.	<a href="https://archive.epa.gov/ada/web/html/mna.html">https://archive.epa.gov/ada/web/html/mna.html</a>